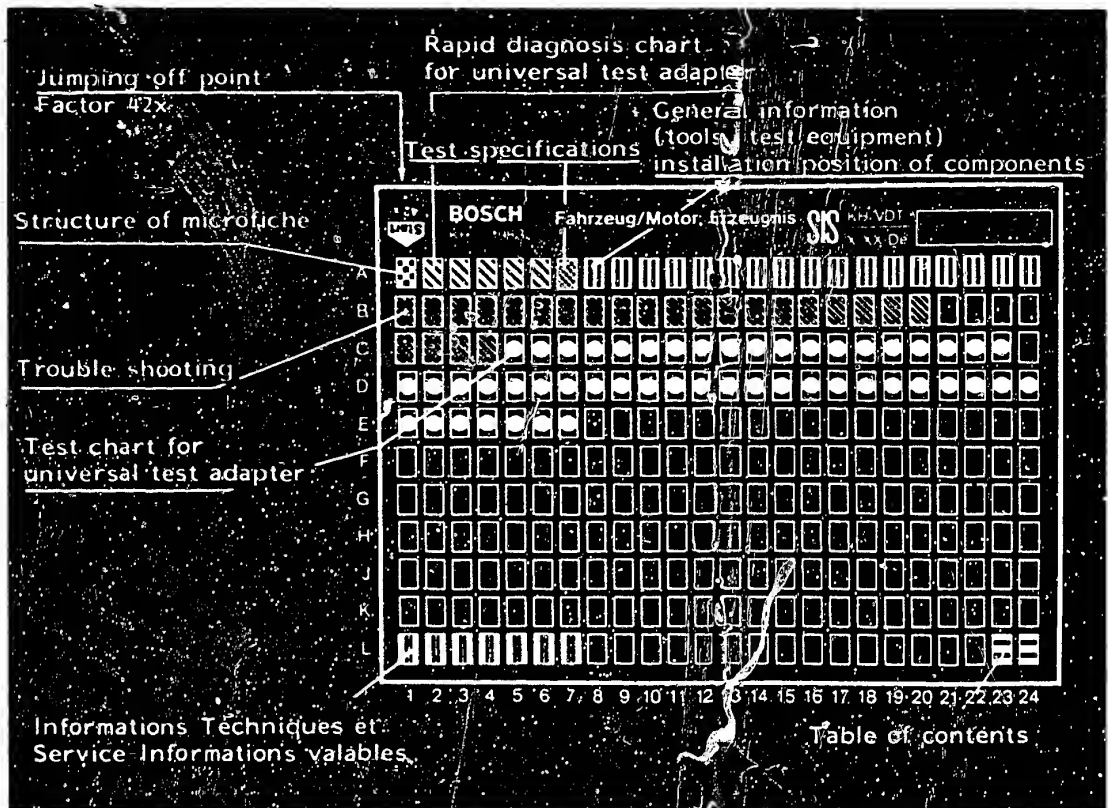


## Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

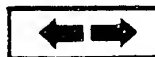
<b>E 16</b>	Product/assembly/test step	
	Vehicle/engine	

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page  
section

4. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

**C 6**

**A1**

Trouble-Shooting Plan



## 1. Rapid diagnosis chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced expert to quickly test the electrical part of the ignition system using the universal test adapter.

The rapid diagnosis chart contains the following information:

- Sequence of test steps
- Switch positions on universal test adapter
- Remarks on operation of universal test adapter or other components
- Test specifications on motortester
- References to coordinates for detailed trouble-shooting.

If detailed information and instructions are required, always proceed according to the trouble-shooting program starting on Coordinate B1.

### 1.1 Requirements for testing

Secondary signal (oscilloscope/ignition timing light) present.


Basic ignition setting, timing advance, as well as high-tension side (H.T. ignition cable, spark-plug connector, spark plug) O.K.

Battery fully charged, fuel system O.K. Engine mechanically O.K.

Ambient temperature/ignition system temperature 0° to + 100° C (temperature has a considerable influence on measured values).



# Rapid diagnosis chart for universal test adapter

Test step	Switch position		Remarks	Test specifications (reading)	For trouble-shooting see Coordinates
	V	Ω			
1	1	-	Timing advance unit not connected Ignition switch and emergency ignition switch "ON", measure voltage	Approx. battery voltage	C 11
2	2	-	Ignition switch and emergency ignition switch "ON", measure voltage	Approx. battery voltage	C 13
3	3	-	Ignition switch and emergency ignition switch "ON", measure voltage	Approx. half battery voltage	C 15
4	4	-	Ignition switch and emergency ignition switch "ON", measure voltage	Approx. half battery voltage	C 17
5	6	-	Ignition switch and emergency ignition switch "ON", pull clutch lever, operate starting switch, measure voltage	Approx. battery voltage	C 19
6	7	-	Ignition switch and emergency ignition switch "ON", pull clutch lever, operate starting switch, measure voltage	Approx. battery voltage	C 21
7	8	-	Ignition switch "OFF" Connect timing advance unit Ignition switch and emergency ignition switch "ON", measure voltage	0 V	C 23
8	9	-	Ignition switch and emergency ignition switch "ON", measure voltage	0 V	D 1
9	10	-	Ignition switch and emergency ignition switch "ON", measure voltage	Approx. 10 V	D 3
10	11	-	Ignition switch and emergency ignition switch "ON", measure voltage	Approx. 10 V	D 5
11	11	-	Ignition switch and emergency ignition switch "ON", apply approx. 400 mbar to vacuum switch, measure voltage	Approx. 0 V	D 7
12	12	-	Ignition switch and emergency ignition switch "ON", start engine and run at idle, rectangular pulse on oscilloscope?		D 9

**A3**

Rapid diagnosis chart for universal test adapter  
BMW motorcycle







**A4**

Rapid diagnosis chart for universal test adapter  
BMW motorcycle

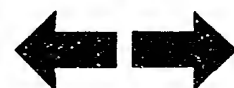


Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Remarks	Test specifications (reading)	For trouble shooting see Coordinates
	V	$\Omega$			
13	13	-	Ignition switch and emergency ignition switch "ON", start engine and run at idle, rectangular pulse on oscilloscope?		D 13
14	14	-	Ignition switch and emergency ignition switch "ON", start engine and run at idle, rectangular pulse on oscilloscope?		D 17
15	15	-	Ignition switch and emergency ignition switch "ON", start engine and run at idle, primary signal on oscilloscope?		D 19
16	15	-	Ignition switch and emergency ignition switch "ON", run engine at idle, press button 3 on universal test adapter, engine stops	After max. 5 sec. approx. half battery voltage	D 21
17	16	-	Ignition switch and emergency ignition switch "ON", start engine and run at idle, primary signal on oscilloscope?		D 23
18	16	-	Ignition switch and emergency ignition switch "ON", run engine at idle, press button 3 on universal test adapter, engine stops	After max. 5 sec. approx. half battery voltage	E 1
19	7	-	Disconnect ignition trigger unit plug connector, ignition switch and emergency ignition switch "ON", operate starting switch, measure voltage.	< 2 V	E 3
20	2	-	Disconnect ignition trigger unit plug connector, ignition switch and emergency ignition switch "ON", operate starting switch, measure voltage	< 2 V	E 5

**A5**

Rapid diagnosis chart for universal test adapter  
BMW motorcycle



**A6**

Rapid diagnosis chart for universal test adapter  
BMW motorcycle



## 2. Test specifications

Basic ignition setting  
at 900...1000 min<sup>-1</sup>

5...7 BTDC

**B9**

Ignition coil primary  
Ignition coil secondary

1.9...3.0  $\Omega$

8.2...14.5 k $\Omega$

**B17**

Spark-plug connector  
Ignition-coil suppressor

5 k $\Omega$

1 k $\Omega$

**B17**

Valve clearance (engine cold  
max. 35°C)

Inlet valve

0.15 mm

Exhaust valve

0.20 mm

Engine idle speed

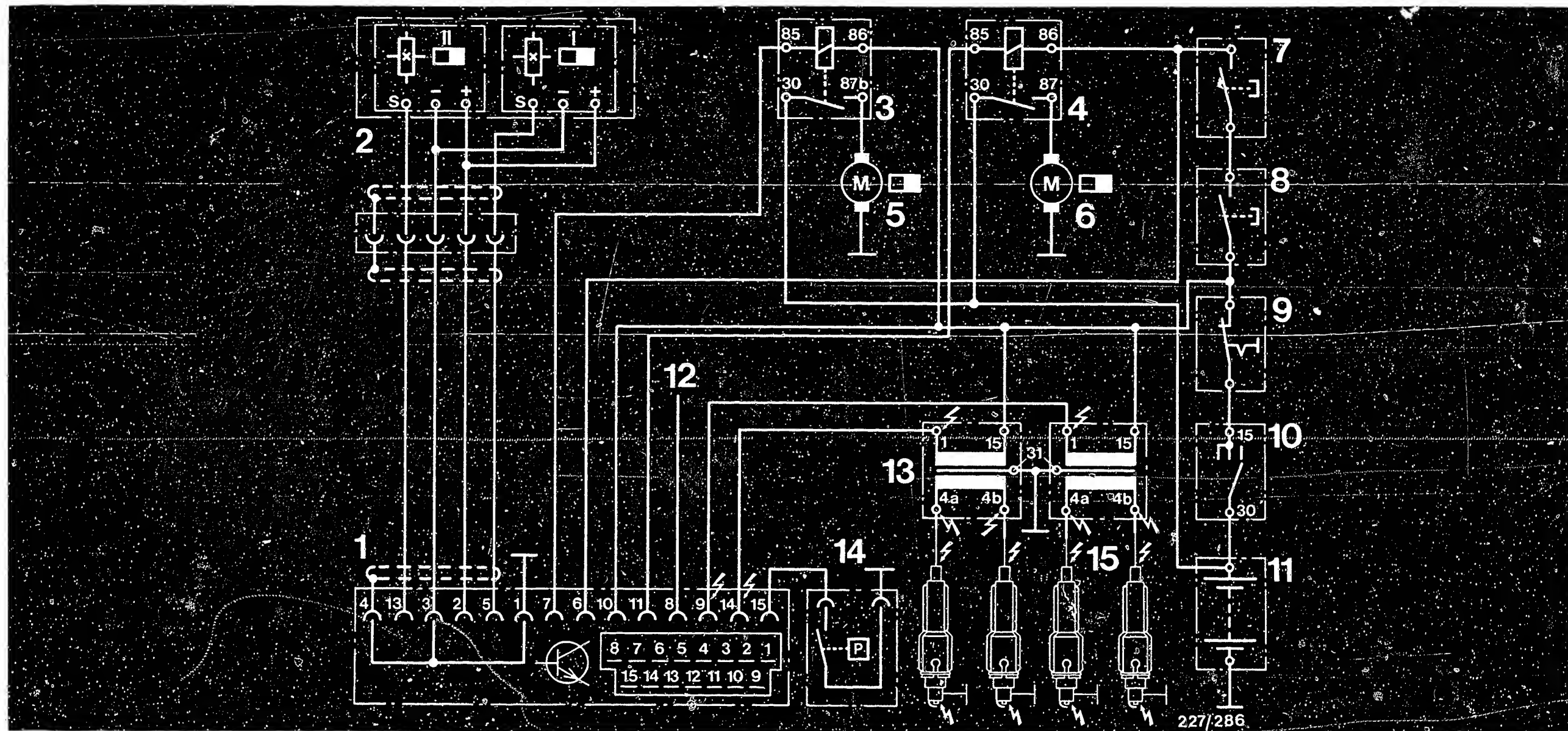
900...1000 min<sup>-1</sup>

**A7**

Test specifications

BMW motorcycle





227/286

⚡ = dangerous voltages (400 V - 25 kV)

### 3. Electrical terminal diagram

- |                              |                              |                               |                            |
|------------------------------|------------------------------|-------------------------------|----------------------------|
| 1 = Timing advance unit      | 4 = Starting interlock relay | 8 = Clutch switch             | 12 = tn pulse, LE-Jetronic |
| 2 = Ignition trigger unit    | 5 = Electric fuel pump       | 9 = Emergency ignition switch | 13 = Ignition coils        |
| 3 = Electric fuel pump relay | 6 = Starting motor           | 10 = Ignition switch          | 14 = Vacuum switch         |
|                              | 7 = Starting switch          | 11 = Battery                  | 15 = Spark plugs           |

**A8**

Electrical terminal diagram  
BMW motorcycle



**A9**

Electrical terminal diagram  
BMW motorcycle



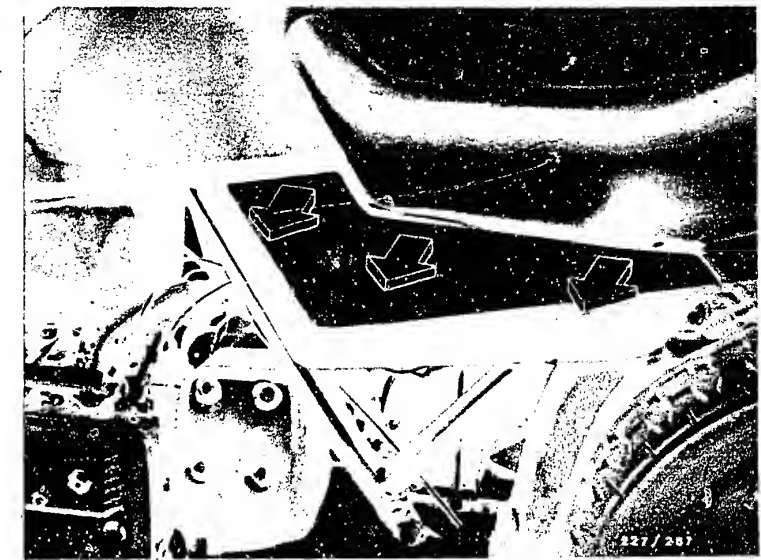


#### 4. Installation position of components

To test or remove and install the components, it is necessary in some cases to remove the battery cover, radiator cowl and fuel tank.

##### Notes on removal (battery cover, radiator cowl):

Remove battery cover on left and right (plug-in connection). See arrows in top picture.  
Unhook radiator cowl on left and right (plug-in connection). See arrow in centre picture.  
Remove fastening screws from radiator cowl at front. See arrows in bottom picture.



**A10**

Installation position of components  
BMW motorcycle



**A11**

Installation position of components  
BMW motorcycle



### Notes on removal (fuel tank):

Battery cover and radiator cowl removed.

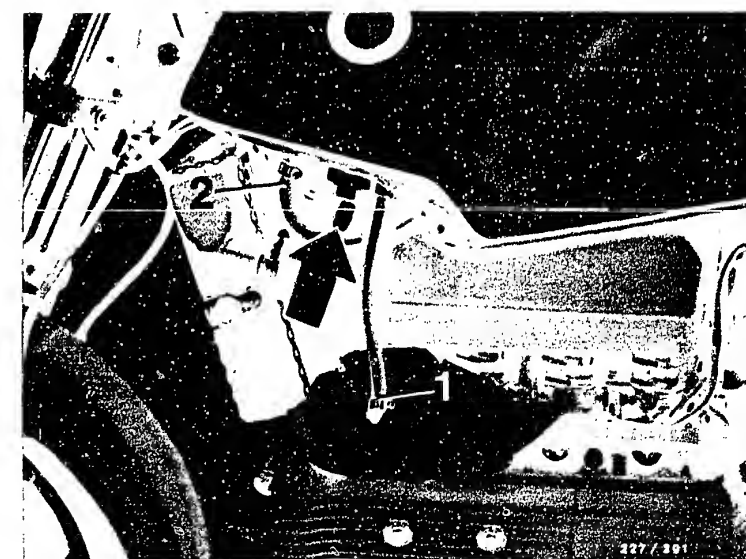
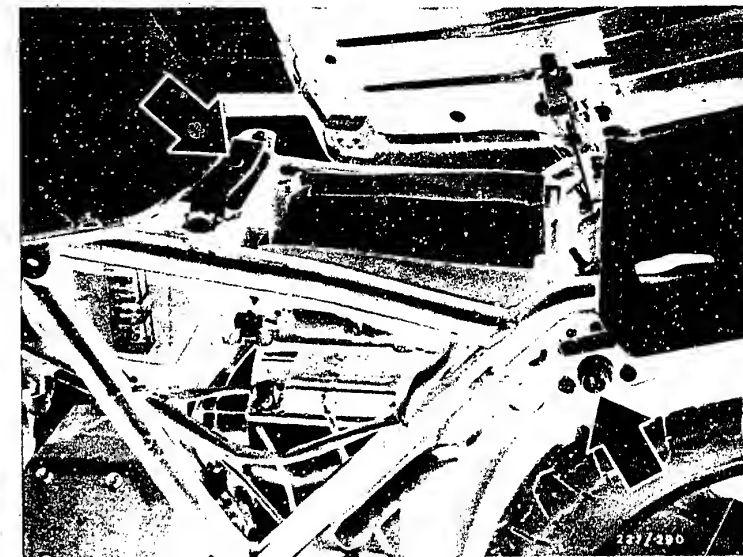
Unlock seat bench with ignition key and hinge up.

Unscrew rear tank mounting with bracket. See arrow in top picture.

Loosen hose clamps (1) and (2) from fuel hoses. Pull off hoses. See bottom picture.

Disconnect plug-in connector of electric fuel pump. See arrow in bottom picture.

On bottom side of tank, pull off hose for tank vent and tank overflow. Remove tank (raise at rear and pull toward rear).



**A12**

Installation position of components

BMW motorcycle



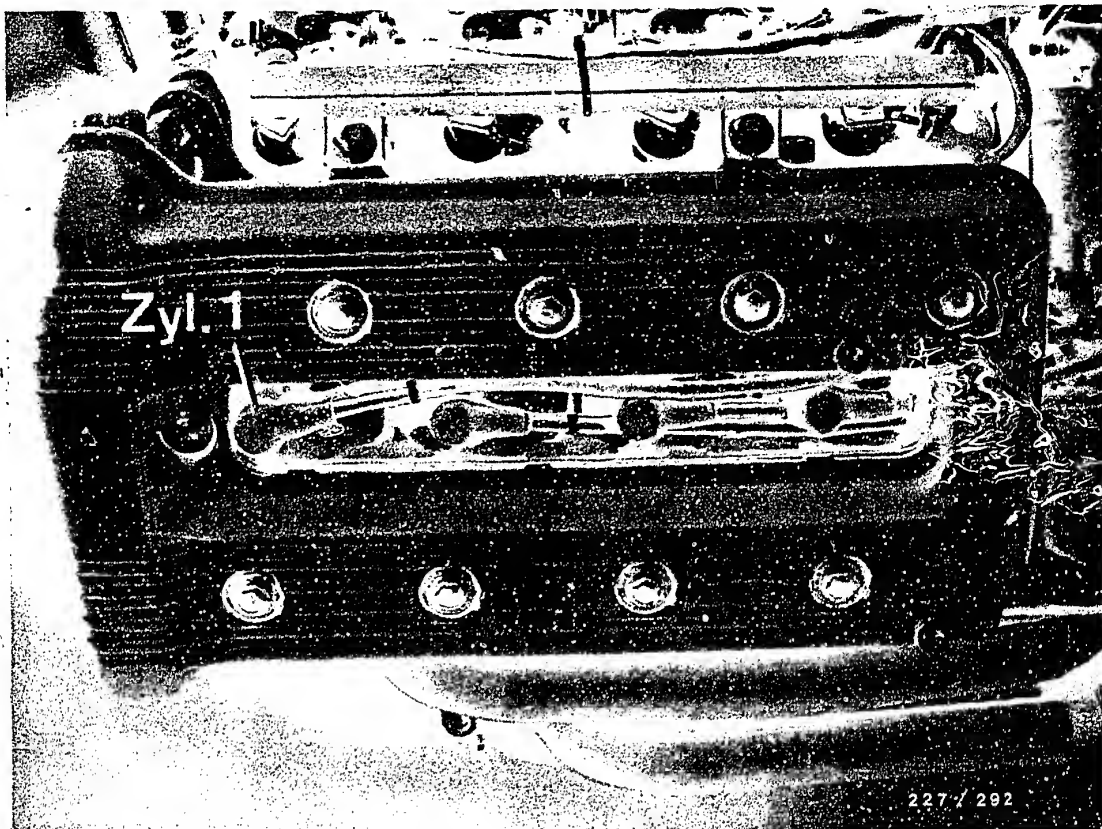
**A13**

Installation position of components

BMW motorcycle







The spark plugs are on the left-hand side in the forward direction of travel under the spark-plug cover. See picture.

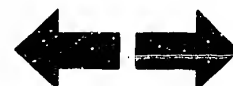
Note on removal:

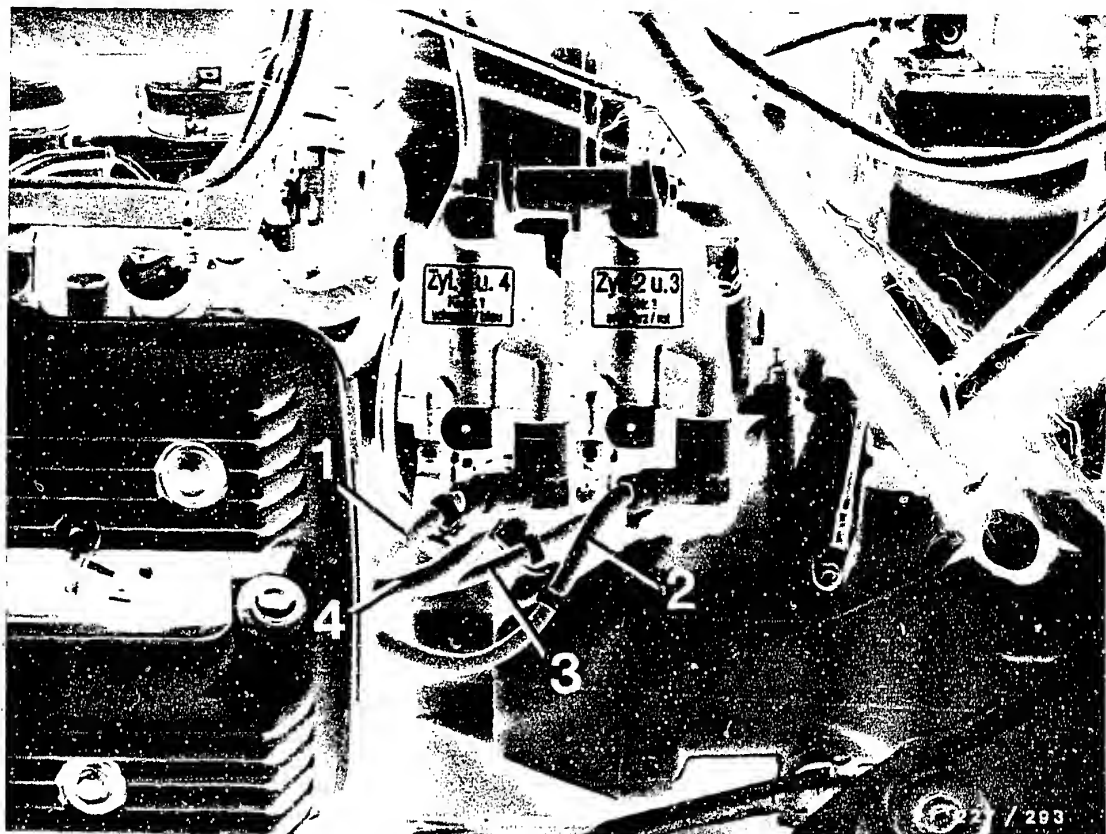
Unscrew spark-plug cover (not shown).

Pull off shielded spark-plug connectors using combination pliers (connect again later in the same manner).

Rubber-type spark-plug connectors are pulled off and plugged on again by hand.

Unscrew spark plug using the socket wrench combination (vehicle tools under seat bench).



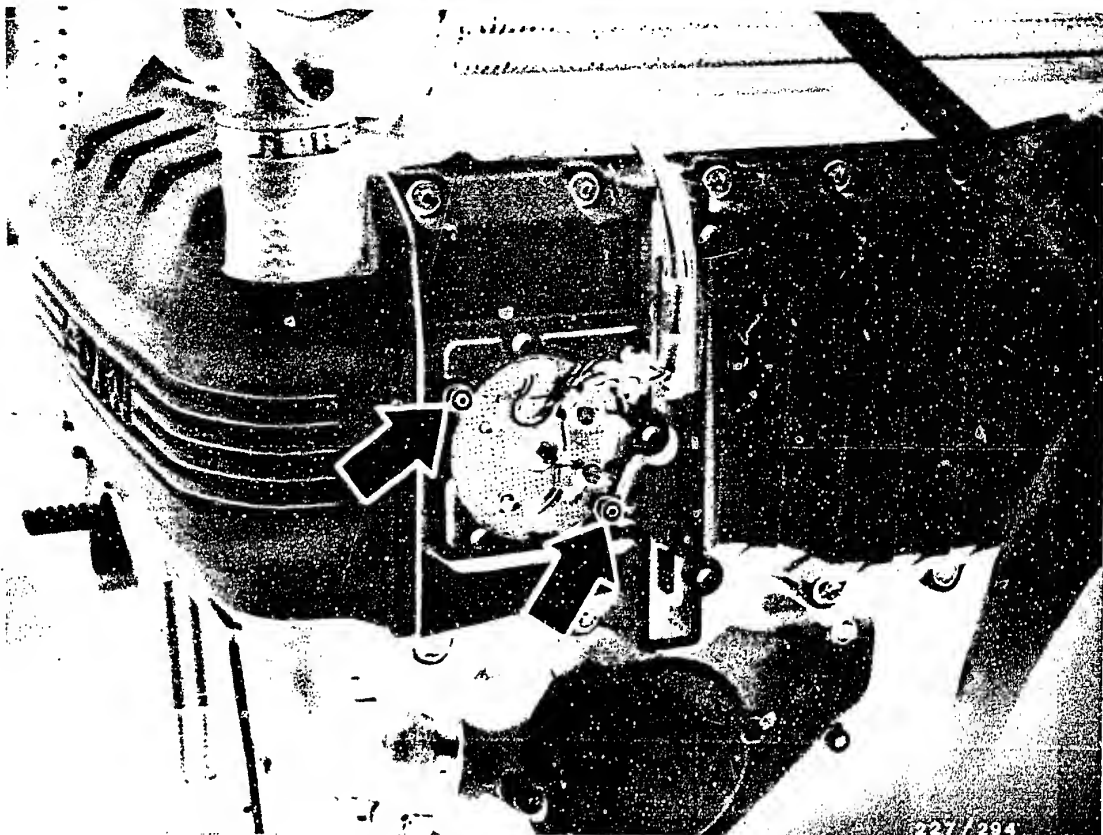


- 1 = H.T. ignition cable of cyl. 1 (left-hand ignition coil)
- 2 = H.T. ignition cable of cyl. 2 (right-hand ignition coil)
- 3 = H.T. ignition cable of cyl. 3 (right-hand ignition coil)
- 4 = H.T. ignition cable of cyl. 4 (left-hand ignition coil)

The ignition coils are near the battery (see picture).

Note on removal:

Remove ignition-coil cover (not shown).

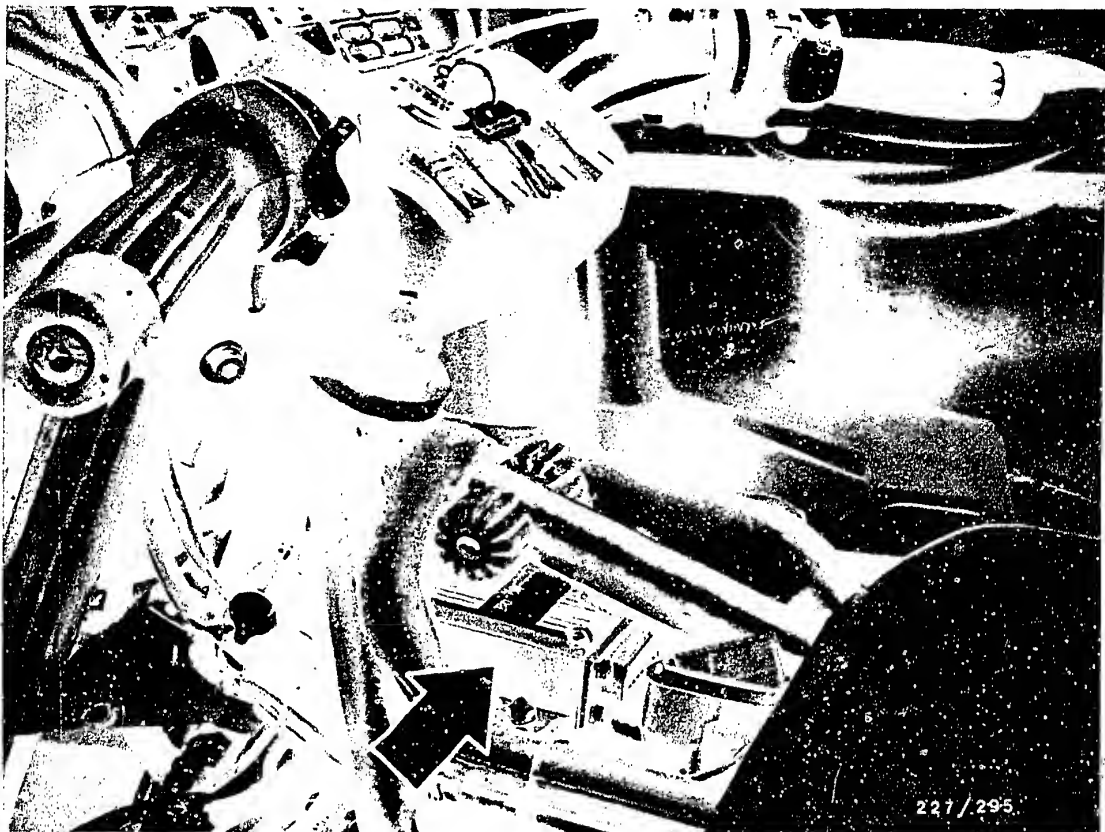


The ignition trigger units are on the engine block at the front (see picture).

Note on removal:

Unscrew protective cover (not shown).

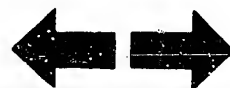


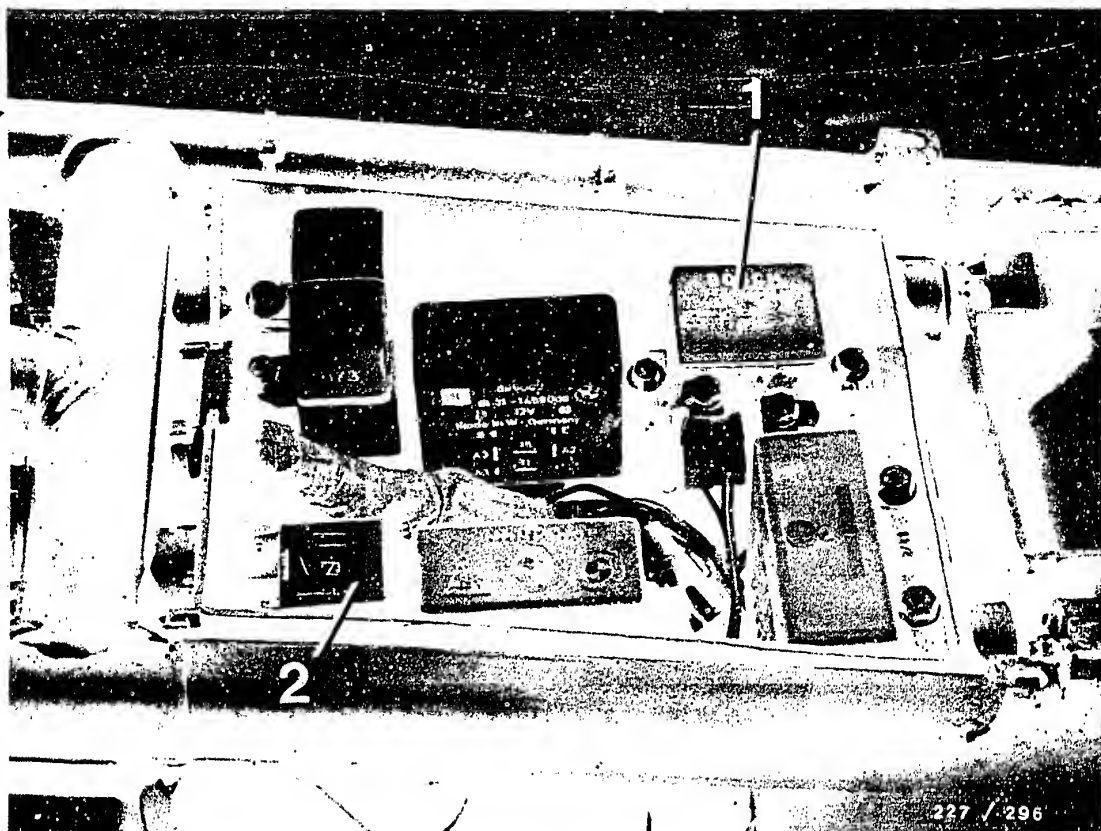


The timing advance unit is in the front part of the frame (see picture, arrow).

Note on removal:

Remove battery cover, radiator cowl, fuel tank.





- 1 = Starting interlock relay  
2 = Electric fuel pump relay

The starting interlock relay and the electric fuel pump relay are in the central-electrics console (see picture).

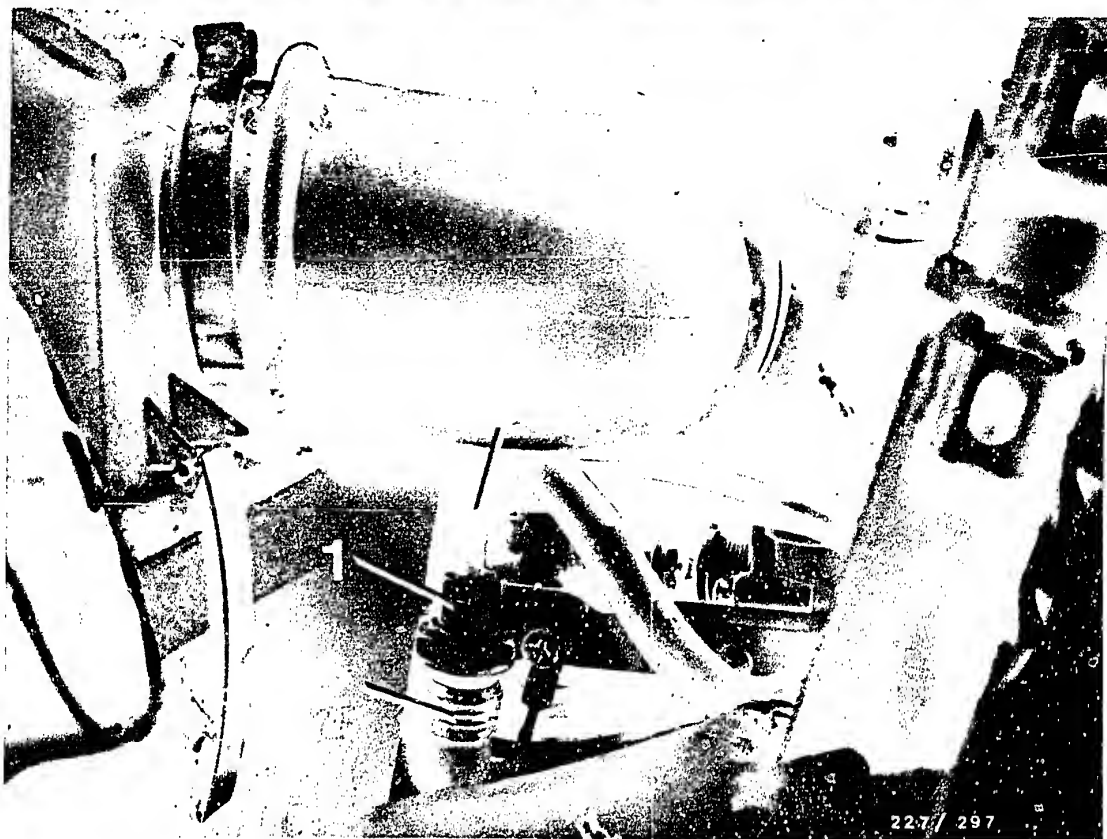
Note on removal:

Remove battery cover, radiator cowl, fuel tank (as already described).

Unscrew rear tank mounting with bracket and remove cover plate from central-electrics console (not shown).







- 1 = Vacuum switch
- 2 = Electrical connection
- 3 = Vacuum hose

The vacuum switch is near the air filter (see picture).

Note on removal:

Remove radiator cowl on right.

Remove front part of intake-air line (not shown).



## 5. Necessary test equipment and aids

Motortester	MOT 201*	0 684 000 201
Motortester	MOT 300*	0 684 000 300
Motortester	MOT 400*	0 684 000 400
Ohmmeter or e. g.	ETE 014.00 Pentavi Wh 2	0 684 101 400 Commercially available
Universal test adapter	ETT 018.01	0 684 101 802
Adapter lead		1 684 463 139
Test prods		Commercially available
Vacuum pump e. g. from Fa. Korinth Ludwig-Kloss-Str.21 6450 Hanau 7-Steinheim	Mityvac	Commercially available

\* Only the above-listed motortesters can be used for testing the engine speed and rectangular pulse (on/off ratio) and for checking the ignition timing.



## 6. Danger of accident on electronic ignition systems

Increased demands of modern engines on the ignition system combined with the desire for freedom of maintenance have recently led to electronic ignition systems being fitted as standard. Usually the ignition power of electronic systems (of almost all manufacturers) is higher than that of conventional systems, and there are signs of further increases in power. Electronic ignition systems thus reach a power range which can be highly dangerous if live parts or terminals are touched (both on the primary as well as the secondary sides).

In this connection we should like to point out that the VDE regulations, in particular VDE 0104/7.67 and/or the respective national regulations must be followed when testing or working on the ignition system.

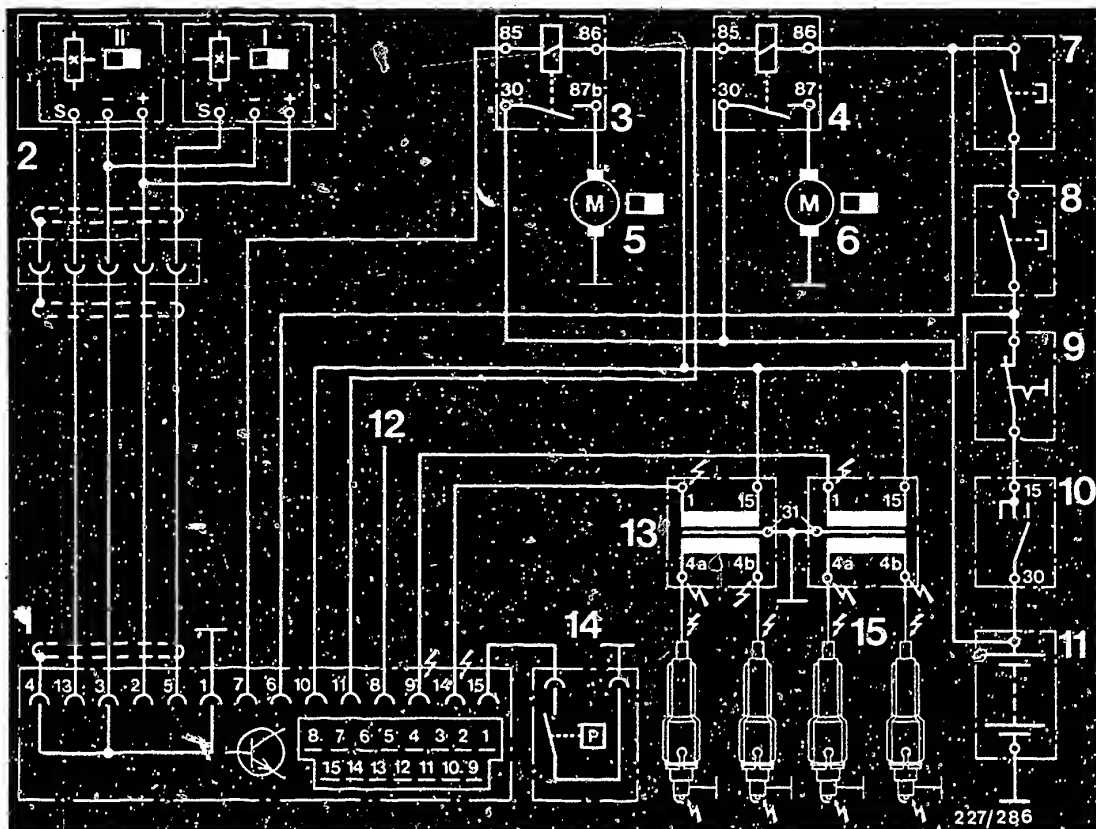
The ignition should always be switched off when working on the ignition system (switch off ignition or voltage source). Such work includes:

- Connecting of engine test equipment (timing light, dwell-tach tester, ignition oscilloscope, etc.).
- Replacing parts of the ignition system (spark plug, ignition coil, ignition distributor, H.T. ignition cable, etc.).


If, when testing the ignition system or when performing adjustment work on the engine (e.g. LE-Jetronic), it becomes necessary to switch on the ignition (ignition or voltage source), the above-mentioned dangerous voltages occur over the entire system.

The danger of accidents exists, therefore, not only on the individual components of the ignition system (e.g. ignition coil, timing advance unit, ignition harness), but also on the wiring harness (e.g. tachometer connection, diagnostic plug), at plug-in connections and on test equipment.





- |                              |                               |
|------------------------------|-------------------------------|
| 1 = Timing advance unit      | 9 = Emergency ignition switch |
| 2 = Ignition trigger unit    | 10 = Ignition switch          |
| 3 = Electric fuel pump relay | 11 = Battery                  |
| 4 = Starting interlock relay | 12 = Ign pulse, LE-Jetronic   |
| 5 = Electric fuel pump       | 13 = Ignition coil            |
| 6 = Starting motor           | 14 = Vacuum switch            |
| 7 = Starting switch          | 15 = Spark plugs              |
| 8 = Clutch switch            |                               |

 = dangerous voltages (400 V - 25 kV)

### Electrical terminal diagram

The dangerous locations are identified by danger arrows taking the example of the terminal diagram of an electronic ignition system.



## 7. Important vehicle information

- Only perform resistance measurements with the ignition off or with the battery disconnected (measuring instrument defective).
- When testing the compression, disconnect term.1 from ignition coils (dangerous high voltage, insulation damage to ignition coil, ignition harness).  
When connecting, do not mix up term.1.  
Caution: Term.1 must not come into contact with battery positive.
- To prevent the timing advance unit from being irreparably damaged, the secondary side (respective H.T. ignition cable including spark-plug connector) of the ignition system must have at least 2 k  $\Omega$  interference suppression.
- No external voltage, e. g. ohmmeter, may be connected to ignition trigger units (Hall generators).  
Caution when changing over measuring ranges.
- Do not disconnect battery with engine running.
- Incorrect polarity of battery will destroy timing advance unit.
- Do not use a starting aid with more than 16 V or a fast charger for starting.





- The specified ignition coil (see Part No.) must not be replaced by a different ignition coil.
- No suppression capacitor must be connected to ignition coil term.1 and term.15.
- Ignition coil term.1 must not be brought into contact with ground as a theft-proofing measure (with "ignition on" ignition coil will be destroyed).
- No battery + and test lamp must be connected to ignition coil term.1 (timing advance unit will be destroyed).
- There must be no arcing between ignition coil term. 4a/4b and ignition coil term.1 and term.15. Ignition trigger units and timing advance unit may be destroyed.
- H.T. ignition cables on ignition coil term.4a/4b including spark-plug connectors must not be disconnected during operation.



## 8. Trouble-shooting

### 8.1 How to use the trouble-shooting chart

The trouble-shooting chart beginning on Coordinate B3 contains fault symptoms, cause of trouble, test instructions and coordinate references. Select the possible cause of the trouble in the trouble-shooting chart according to the customer complaint (fault symptom).

If the cause of the trouble is unclear start testing with the detailed self-contained trouble-shooting program or the following test chart starting on Coordinate B7.

If the cause of the trouble has been clearly detected according to the trouble-shooting chart then direct trouble-shooting is possible within the trouble-shooting program by way of the coordinate reference without the entire trouble-shooting program having to be performed for each fault.

If there is no coordinate reference, carry out the trouble-shooting according to the "test instructions" column.

### 8.2 How to use the trouble-shooting program

Since test steps, such as ignition timing, spark plug test etc., cannot be performed with the universal test adaptor, the detailed trouble-shooting program is divided into a "trouble-shooting program" and a "test chart".

If the fault is not found with the trouble-shooting program, continue trouble-shooting with the test chart.

The trouble-shooting program starting on Coordinate B7 is divided into 3 rows of boxes.

The left-hand row contains test instructions and test specifications.

The centre row contains repair instructions.

The right-hand row contains the illustrations/terminal diagrams belonging to the text and explains the items in the illustrations/diagrams.

If the questions in the left-hand row can be conclusively answered with "yes", proceed to the next test down.

If the answer to the question is "no", branch to the centre row and carry out the tests given there.

### 8.3 Before testing, make sure of the following:

Battery fully charged, fuel system O.K., engine mechanically O.K. (e.g. compression, valve clearance etc.), ambient temperature/ignition system temperature 0° to 100°C (temperature has a considerable effect on measured values).

**B1**

Trouble-shooting  
BMW Motorcycle

**B2**

Trouble-shooting  
BMW Motorcycle



9. Trouble-shooting chart  
Customer complaint (fault symptom)

1. Starting motor operates
2. Starting motor operates, but engine fails to start
3. Rough idling
4. Poor throttle response
5. Engine lacks power
6. Misfiring
7. Fuel consumption too high
8. Engine pings when accelerating
9. Backfiring
10. Engine becomes too hot

											Cause of fault	Test instructions	Coordinate
•	•	•	•	•	•	•	•	•	•	•	Not cleat	Perform detailed trouble-shooting	B 7
	•	•	•	•	•	•		•			Spark plugs defective	Assess using ignition oscillogram or remove spark plug and make visal examination.	-----
	•		•	•		•	•		•		Basic ignition timing incorrect	-----	B 9
	•	•	•	•	•						Shunt on secondary side	Assess ignition coil, ignition distributor, ignition harness and spark plug using ignition oscillogram or make visual examination.	-----
	•	•	•	•	•						Open circuit on secondary side	Assess ignition coil, ignition distributor, ignition harness and spark plug using ignition oscillogram, or test for continuity using ohm-meter.	B 17
	•										Open circuit on primary side	-----	B 17
	•	•	•	•	•						Ignition coil defective	-----	B 17

**B3**

Trouble-shooting program  
BMW motorcycle



**B4**

Trouble-shooting program  
BMW motorcycle



## Trouble-shooting chart

Customer complaint (fault symptom)

1. Starting motor operates

- ## 12. Starting motor operates, but engine fails to start

- ### 3. Rough idling

- #### 4. Poor throttle response

- ### 15. Engine lacks power

- ## | 6. Misfiring

17. Fuel consumption too high

18. Engine pings when accelerating

- ## 19. Backfiring

10. Engine becomes too hot

										<u>Cause of fault</u>	<u>Test instructions</u>	<u>Coordinate</u>
			●	●	●					Interference-suppression resistors defective	Assess using ignition oscillogram, or test for continuity using ohmmeter	B 17
							●			Vacuum switch defective		D 5
	●	●								Ignition trigger units defective		D 9
●	●									Timing advance unit defective		C 5
●										Starting interlock relay contact 30/87 or starting motor defective	Test operation of starting interlock relay or starting motor	---
	●							●		Firing sequence incorrect	Firing sequence 1-3-4-2	---

## 10. Trouble-shooting program

### Test secondary signal.

#### Secondary signal testing with oscilloscope

Remove ignition-coil cover.

See arrows in top picture.

Connect oscilloscope to ignition coil of cyl.1 and 2 one after the other according to operating instructions.

See bottom picture.

Start engine.

Oscilloscope must show a secondary signal (of any value).

#### Secondary signal testing with timing light

Connect timing light to ignition coil of cyl.1 and 2 one after the other according to operating instructions.

See bottom picture.

Start engine.

Timing light must flash.

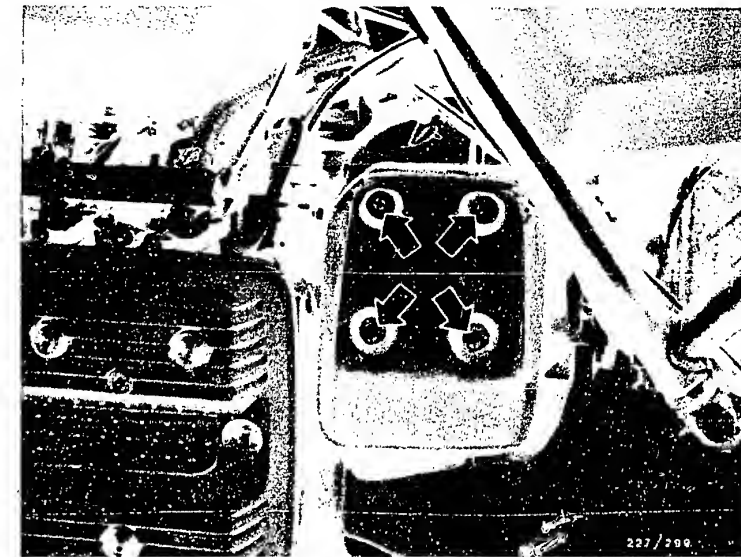
Secondary signal present or timing light flashing?

If no secondary signal or timing light not flashing, then continue testing at C1.

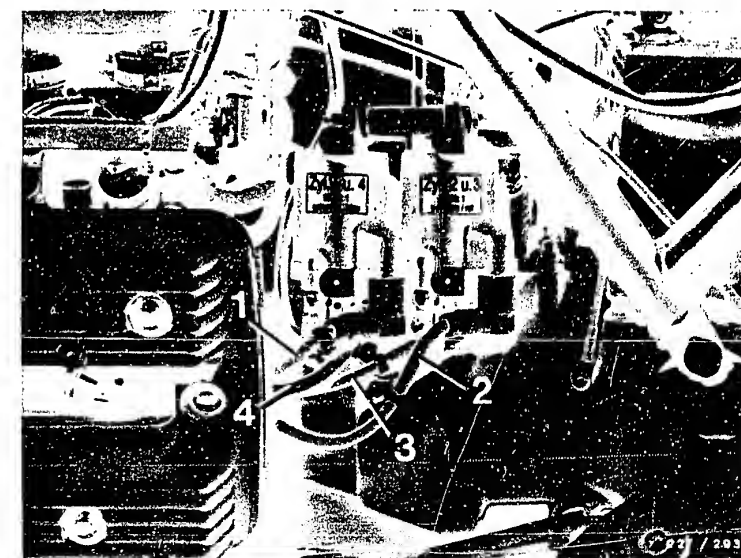
No Tests from B9 onward not necessary.

Yes

Continued on B9/10



Left-hand ignition coil =  
Cylinders 1 and 4  
Right-hand ignition coil =  
Cylinders 2 and 3



**B7**

Trouble-shooting program  
BMW motorcycle



**B8**

Trouble-shooting program  
BMW motorcycle





Yes

Test basic ignition setting.

Remove protective cover from engine block.

See arrows in top picture.

Connect motortester to ignition coil of cyl.  
1/4 according to operating instructions.

Connecting the motortester (engine speed,  
ignition timing):

MOT 201

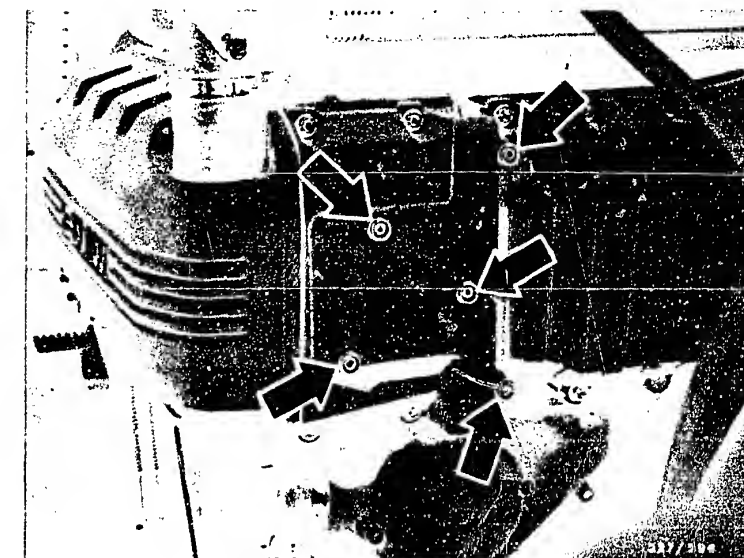
Clamp-on pickup to cyl. 1/4, black clip to  
ground, green clip to ignition coil (of cyl.  
1/4) term.1. See bottom picture.

Yellow clip to battery positive.

Cylinder selector switch to "cyl.2".

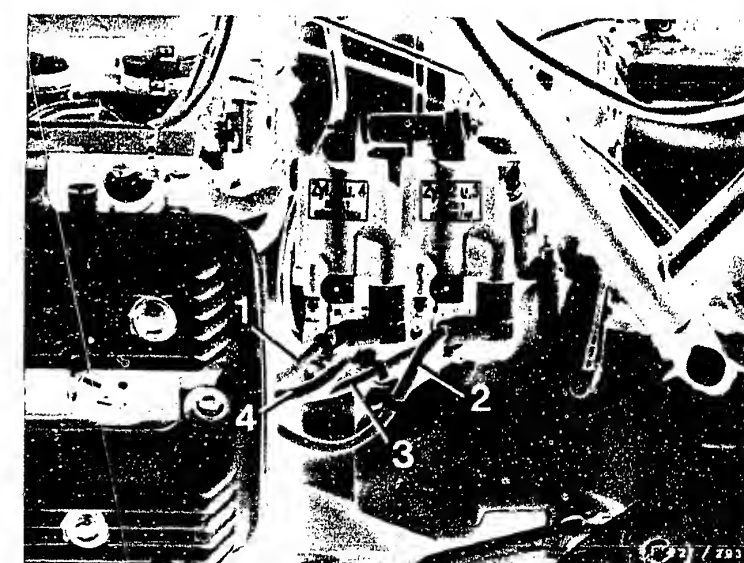
Yes

Continued on B11/B12



Protective cover for ignition trigger  
units

Left-hand ignition coil =  
Cylinders 1 and 4  
Right-hand ignition coil =  
Cylinders 2 and 3



**B9**

Trouble-shooting program

BMW motorcycle



**B10**

Trouble-shooting program

BMW motorcycle



Yes

### MOT 300

Clamp-on pickup to cylinder 1/4, black clip to ground, green clip to ignition coil (of cyl. 1/4) term. 1. See top picture.  
Yellow clip to battery positive.  
Type selector switch to "Wankel", cylinder selector switch to "cyl.1".

### Testing:

Start engine and operate at  $900 \dots 1000 \text{ min}^{-1}$ .  
Basic ignition setting must be  $6 \pm 1^\circ \text{ BTDC}$ .  
Or  
if engine will not start, operate engine at cranking speed. Basic ignition setting must be  $6 \pm 1^\circ \text{ BTDC}$ .

### Note:

1st mark (slot) in direction of rotation =  $24^\circ \text{ BTDC}$   
2nd mark (V-notch) in direction of rotation = TDC  
Since no  $6^\circ \text{ BTDC}$  mark, basic ignition setting is established by means of TDC mark.

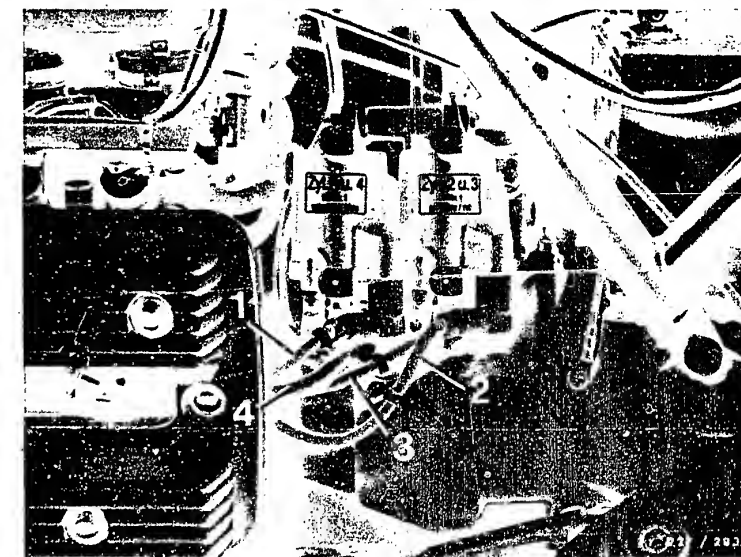
Basic ignition setting O.K.?

Yes

Continued on B13/B14

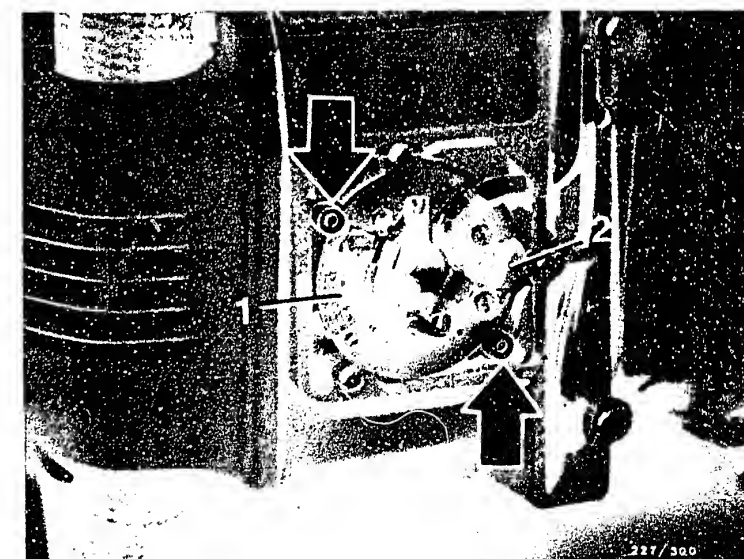
No

Loosen ignition trigger unit mounting (see arrows, bottom picture) and turn ignition trigger unit until  $6 \pm 1^\circ \text{ BTDC}$  is reached.



Left-hand ignition coil =  
Cylinders 1 and 4  
Right-hand ignition coil =  
Cylinders 2 and 3

1 = Ignition trigger unit  
2 = Inspection hole for ignition timing mark



**B11**

Trouble-shooting program  
BMW motorcycle



**B12**

Trouble-shooting program  
BMW motorcycle



Yes

### Test timing advance unit.

Remove protective cover from engine block. See arrows, top picture.

Connect motortester to ignition coil of cyl. 1/4 according to operating instructions.

Connecting the motortester (engine speed, ignition timing):

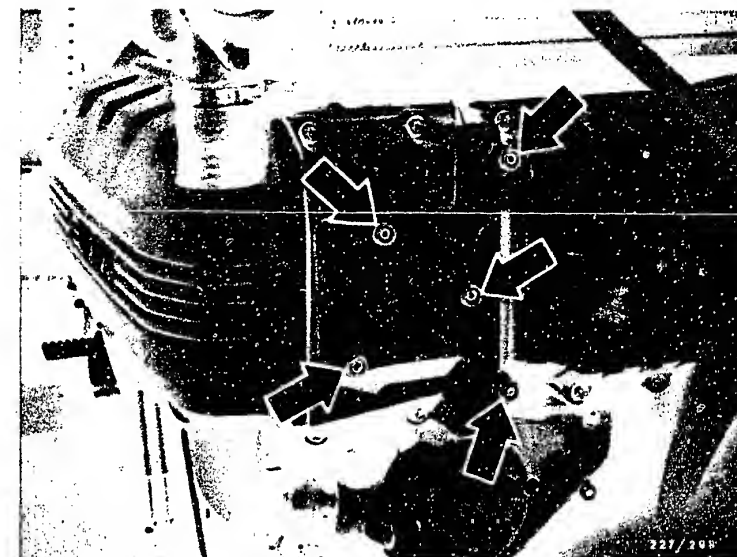
#### MOT 201

Clamp-on pickup to cyl. 1/4, black clip to ground, green clip to ignition coil (of cyl. 1/4) term.1. See bottom picture. Yellow clip to battery positive.

Cylinder selector switch to "cyl. 2".

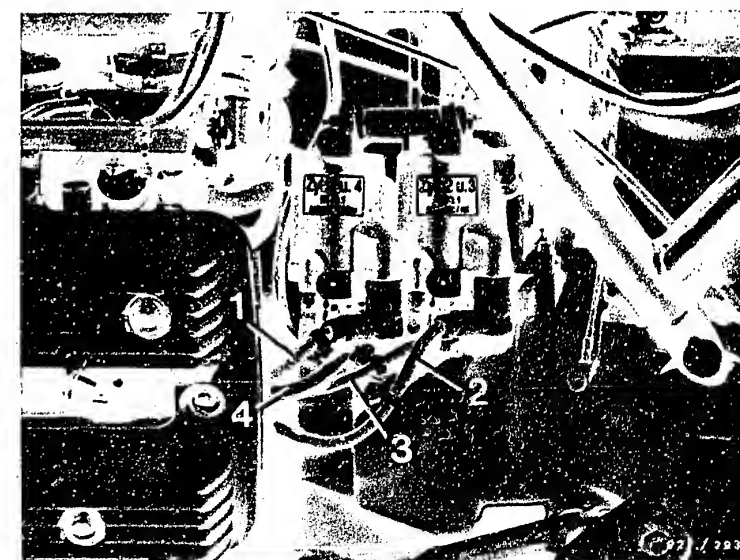
Yes

Continued on B 15/B16



Protective cover for ignition timing units

Left-hand ignition coil =  
Cylinders 1 and 4  
Right-hand ignition coil =  
Cylinders 2 and 3



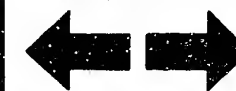
**B 13**

Trouble-shooting program  
BMW motorcycle



**B 14**

Trouble-shooting program  
BMW motorcycle



Yes

### MOT 300

Clamp-on pickup to cyl. 1/4, black clip to ground, green clip to ignition coil (of cyl. 1/4) term.1.  
Yellow clip to battery positive.  
Type selector switch to "Wankel",  
cylinder selector switch to "cyl. 1".

#### Testing:

Disconnect electric lead from vacuum switch and connect to ground using auxiliary cable. See top picture.

#### Caution:

Crankshaft cover does not have ground connection.

Start engine and operate at 3000 min<sup>-1</sup>.

Adjust manual adjuster (delay) of timing light until TDC is indicated. Disconnect auxiliary ground cable. The moving timing mark must move away suddenly.

Does timing mark move away suddenly?

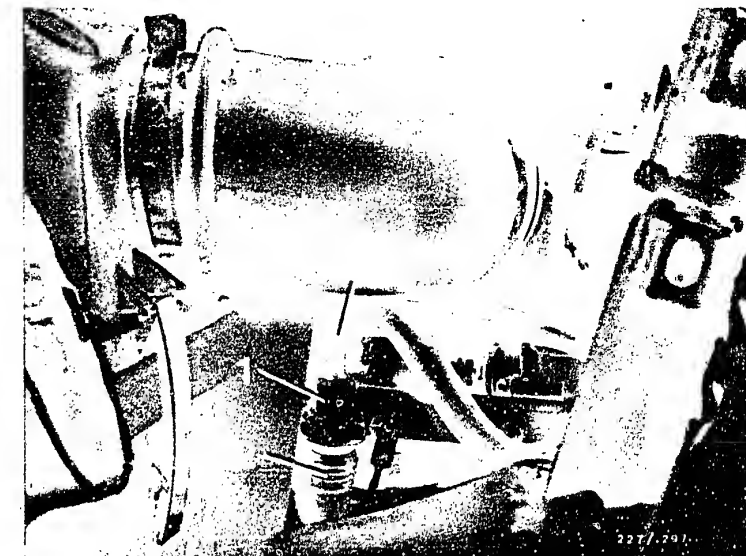
No

Test electric lead from vacuum switch to timing advance unit plug term.15 for open circuit.

Eliminate open circuit.  
If there was no open circuit, replace timing advance unit.

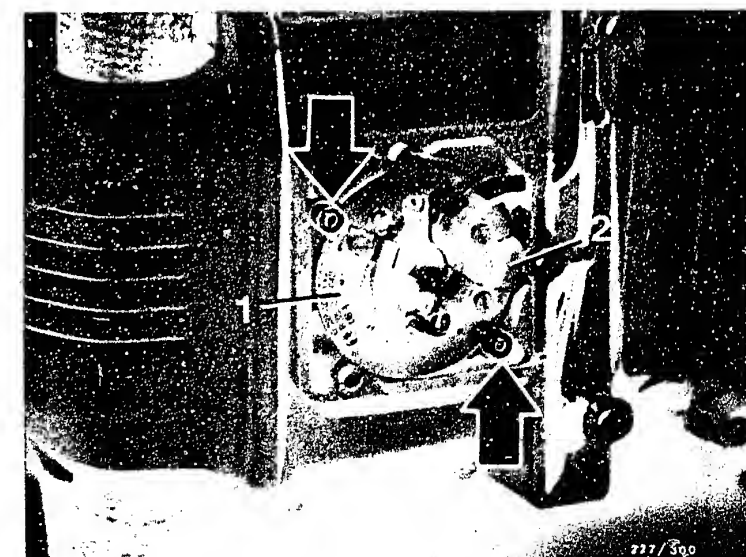
Yes

Continued on B17/B18



- 1 = Vacuum switch
- 2 = Electrical connection
- 3 = Vacuum hose

- 1 = Ignition trigger unit
- 2 = Inspection hole for timing mark



**B 15**

Trouble-shooting program  
BMW motorcycle

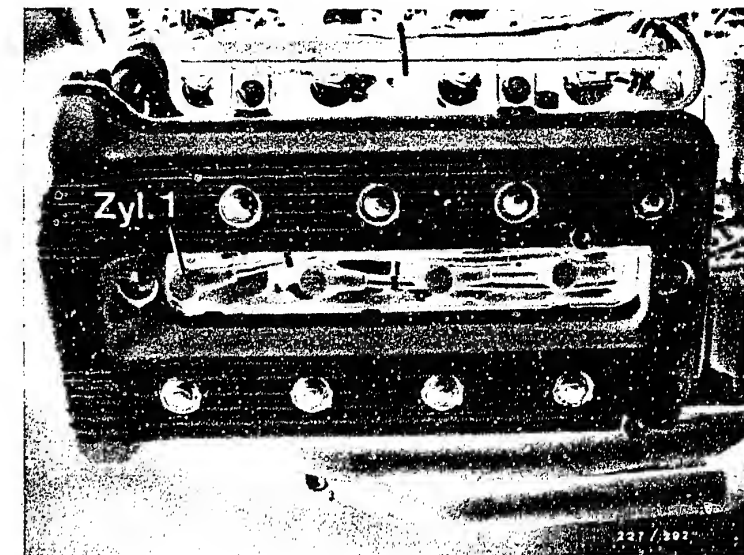
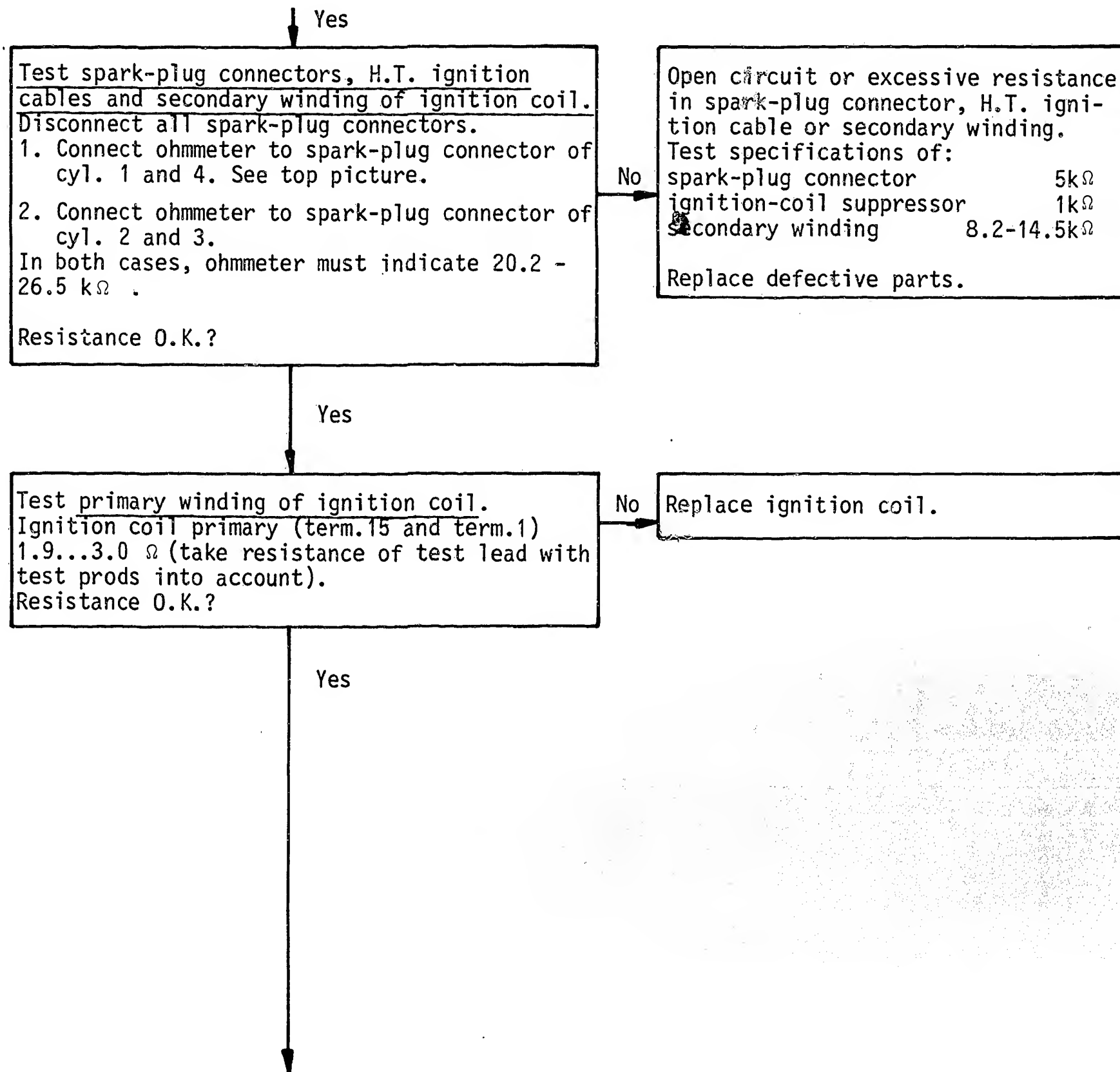


**B 16**

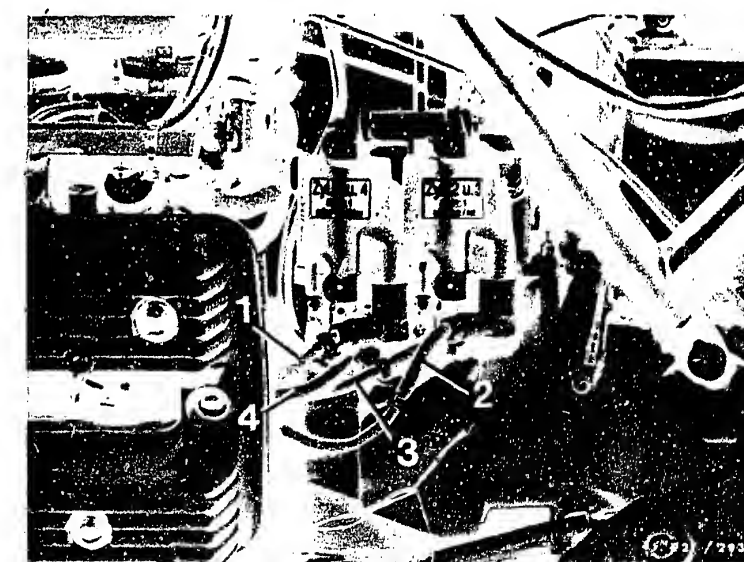
Trouble-shooting program  
BMW motorcycle







Left-hand ignition coil =  
Cylinders 1 and 4  
Right-hand ignition coil =  
Cylinders 2 and 3



Continued on B19/20

**B17**

Trouble-shooting program  
BMW motorcycle

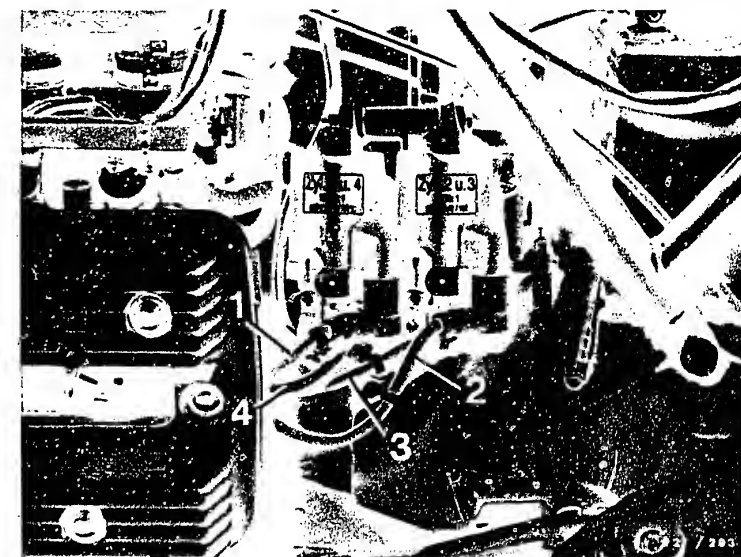
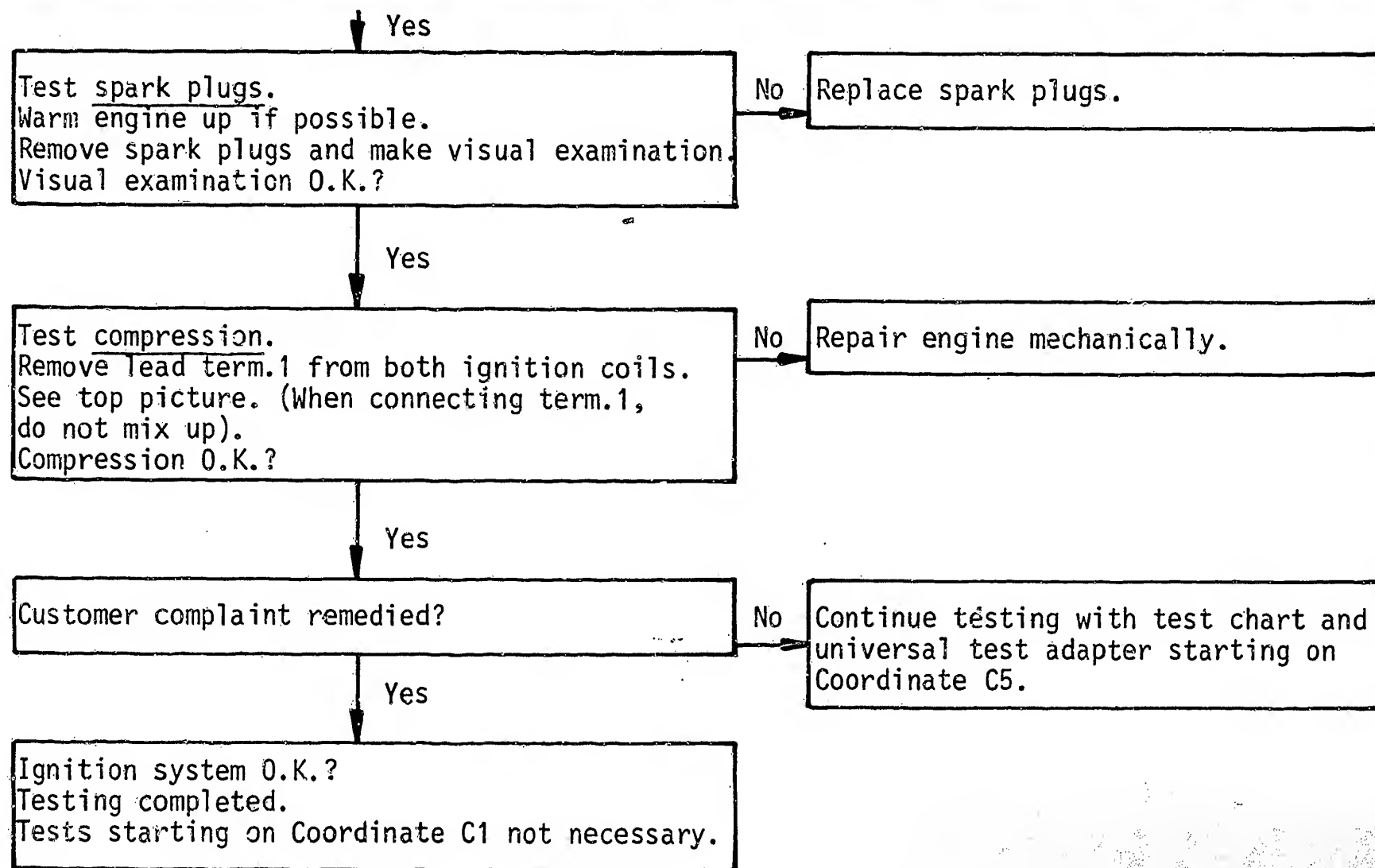


**B18**

Trouble-shooting program  
BMW motorcycle







Left-hand ignition coil =  
Cylinders 1 and 4  
Right-hand ignition coil =  
Cylinders 2 and 3



No secondary signal  
Continued from B7/B8

Yes

Test spark-plug connectors, H.T. ignition cables and secondary winding of ignition coil. Disconnect all spark-plug connectors.

1. Connect ohmmeter to spark-plug connector of cyl. 1 and 4. See top picture.

2. Connect ohmmeter to spark-plug connector of cyl. 2 and 3.

In both cases, ohmmeter must indicate 20.2 - 26.5 k $\Omega$ .

Resistance O.K.?

No

Open circuit or excessive resistance in spark-plug connector, H.T. ignition cable or secondary winding.

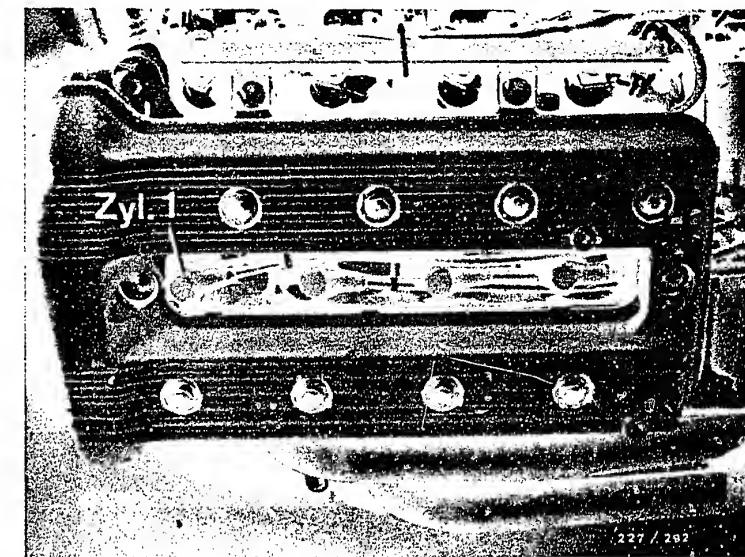
Test specifications of:

spark-plug connector 5k $\Omega$

ignition-coil suppressor 1k $\Omega$

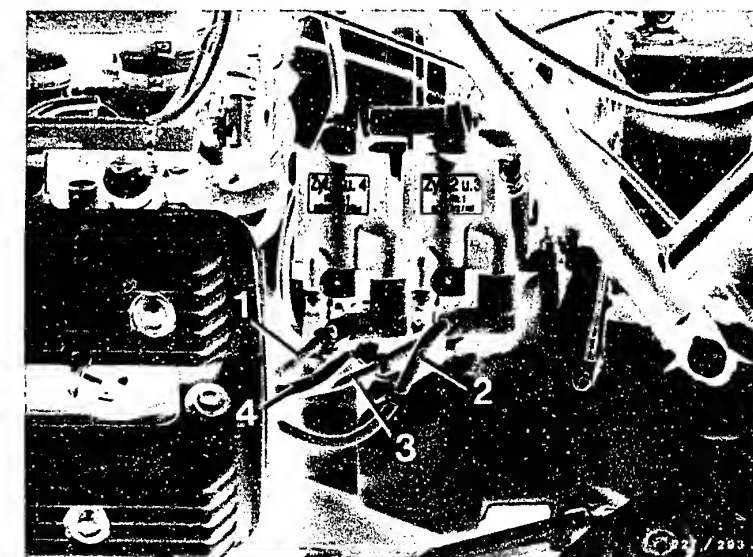
secondary winding 8.2-14.5k $\Omega$

Replace defective parts



Yes

Left-hand ignition coil =  
Cylinders 1 and 4  
Right-hand ignition coil =  
Cylinders 2 and 3



Continued on C3/C4

C1

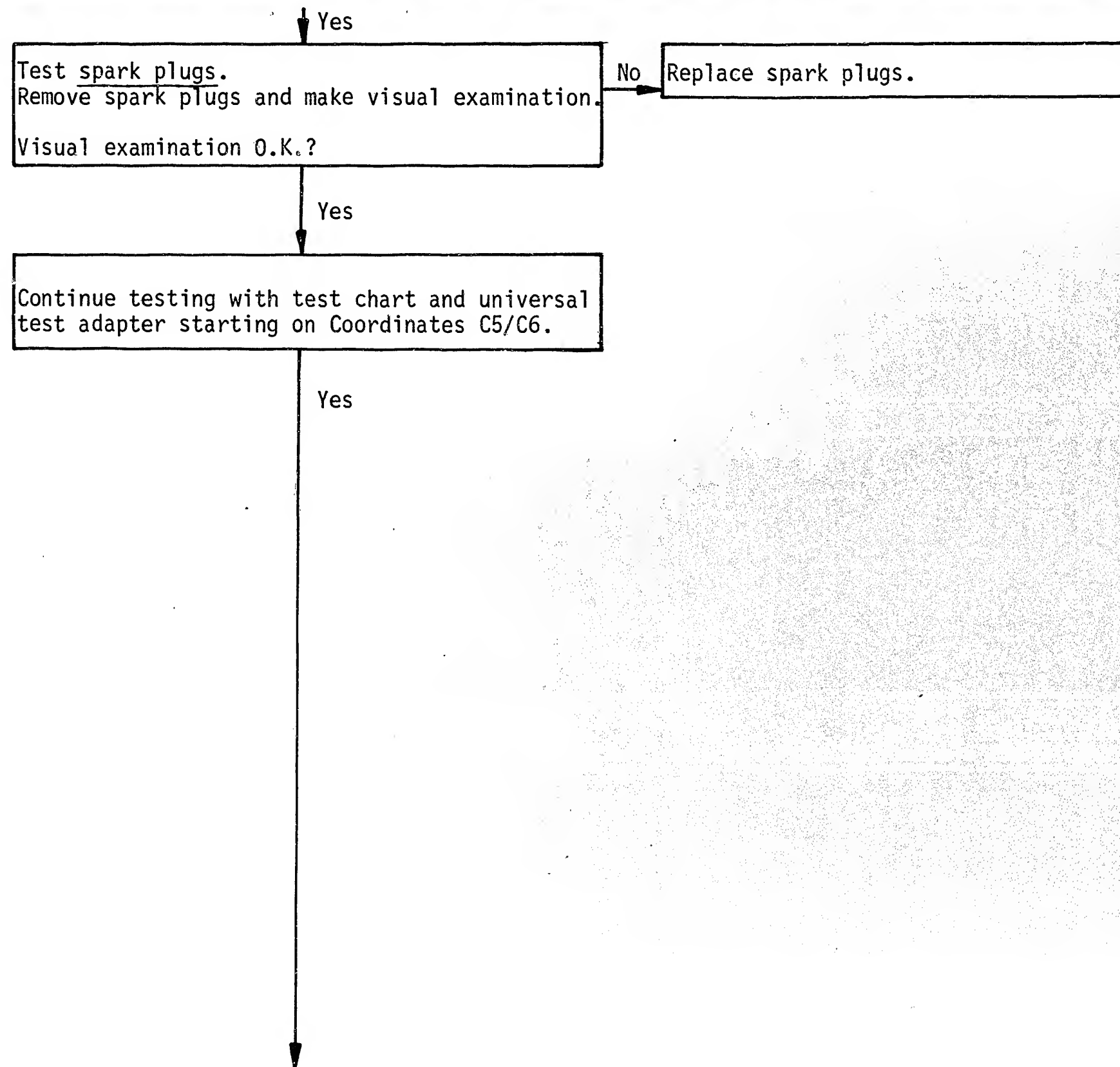
Trouble-shooting program  
BMW motorcycle



C2

Trouble-shooting program  
BMW motorcycle





Continued on C5/C6

**C3**

Trouble-shooting program  
BMW motorcycle



**C4**

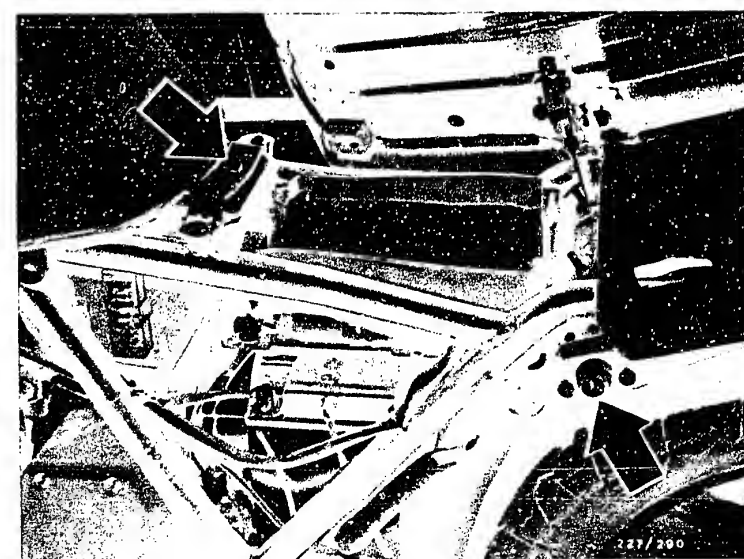
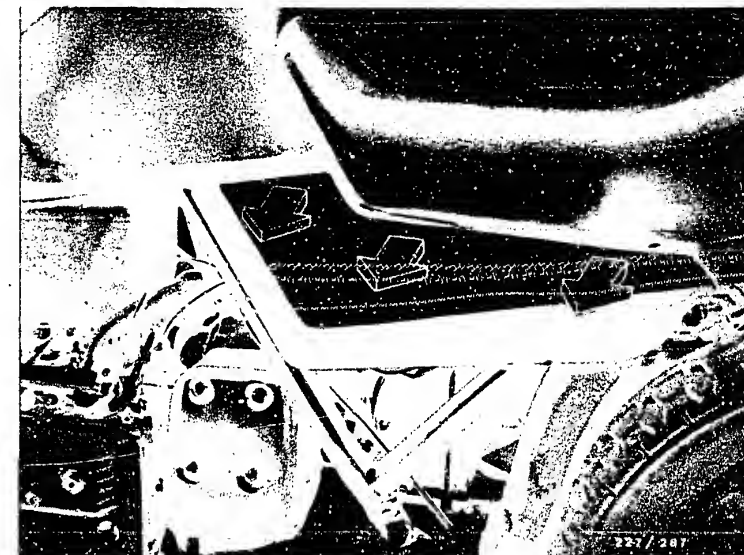
Trouble-shooting program  
BMW motorcycle



11. Test chart for universal test adapter  
(Connect universal test adapter)

Remove battery cover on left and right (plug-in connection). See arrows, top picture.  
Unhook radiator cowl on left and right (plug-in connection). See arrow, centre picture.  
Unlock seat bench with ignition key and hinge up. Unscrew rear tank mounting. See arrows, bottom picture.

Raise tank at rear and pull toward rear until timing advance unit is accessible.  
Tank mounting at front is plug-in connection.



**C5**

Test chart for universal test adapter  
BMW motorcycle



**C6**

Test chart for universal test adapter  
BMW motorcycle





Switch off ignition.

Disconnect timing advance unit plug. See arrow, top picture.

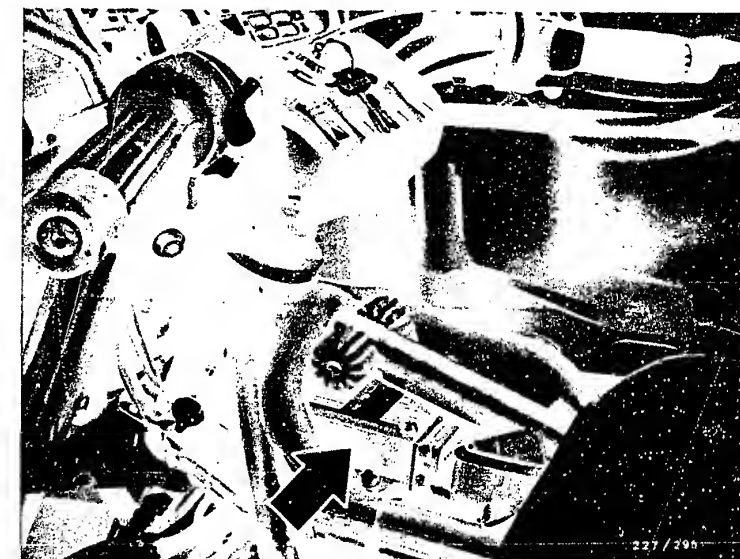
Connect universal test adapter with adapter lead to disconnected timing advance unit plug. See bottom picture.

Note: To test the fully electronic ignition system, first of all only the timing advance unit plug (motorcycle wiring harness) and later the timing advance unit is connected to the universal test adapter. Be sure to follow the instructions in the test chart.

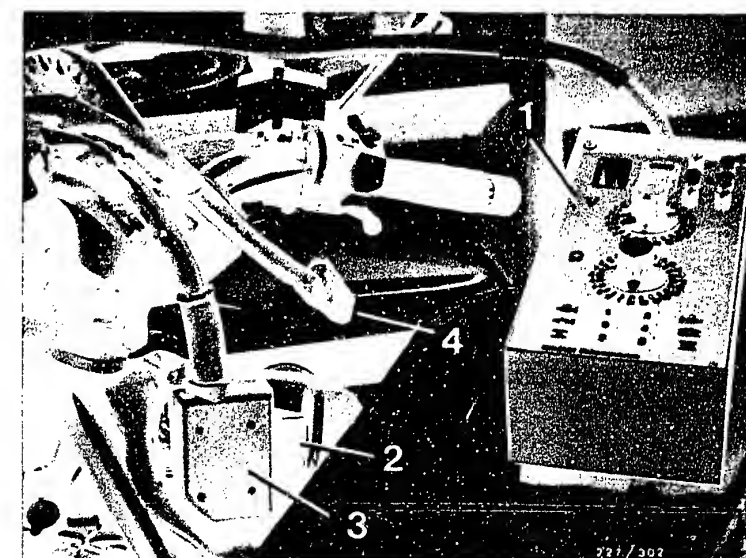
To make the measurements, a measuring instrument for measuring voltage and resistance must be connected to the universal test adapter. For the rectangular pulses (on/off ratio) the motortester must be connected.

The individual test steps are selected with the program switch. The symbols V and  $\Omega$  tell the operator whether voltage or resistance is being measured.

By pressing the buttons, it is possible with the timing advance unit connected and with the engine running to simulate operating conditions. Thus, for example, by pressing button 3 it is possible to stop the engine.

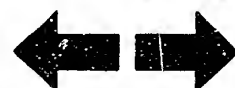


- 1 = Universal test adapter
- 2 = Timing advance unit plug
- 3 = Connection to timing advance unit plug
- 4 = Connection to timing advance unit



**C7**

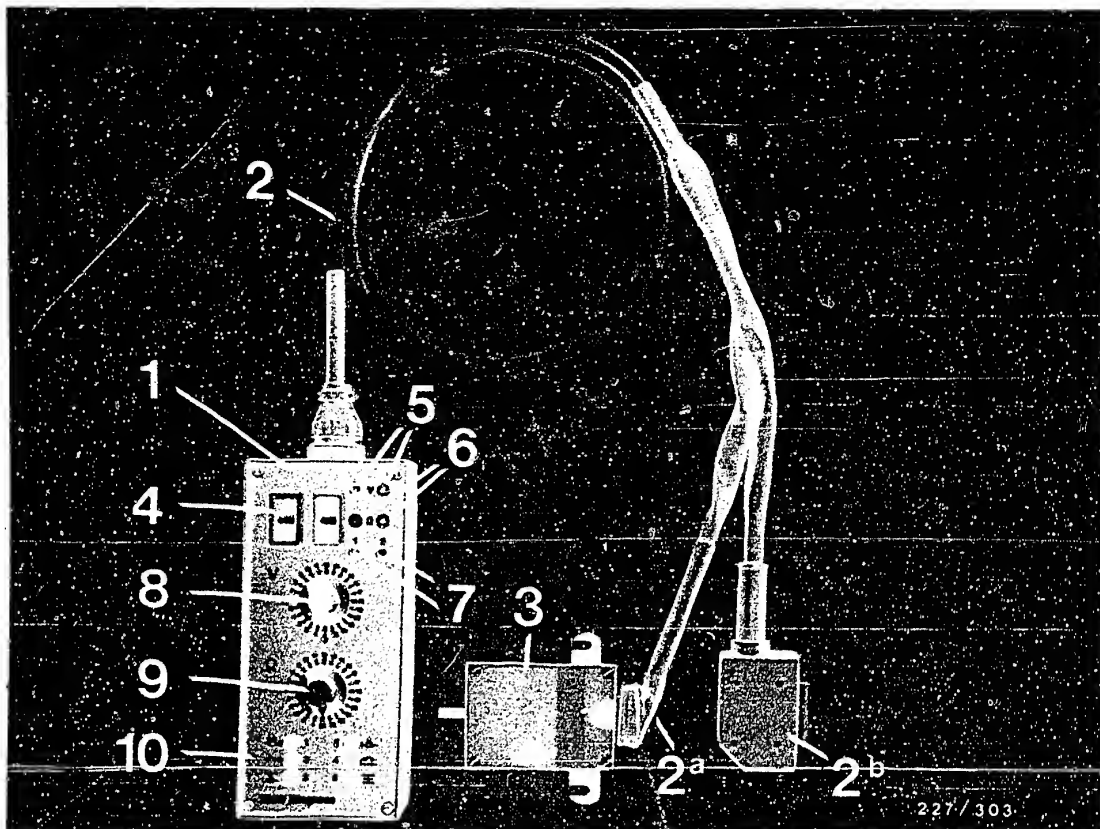
Test chart for universal test adapter  
BMW motorcycle



**C8**

Test chart for universal test adapter  
BMW motorcycle

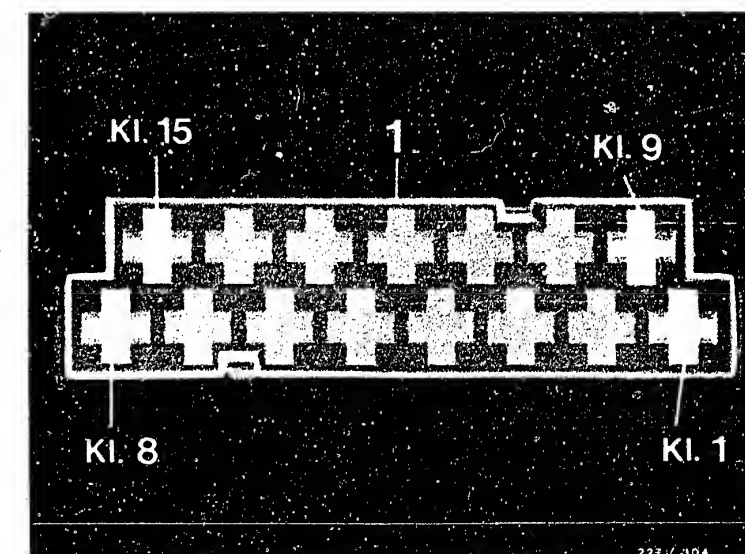




- 1 = Universal test adapter
  - 2 = Adapter lead
  - 2a = Connection to timing advance unit
  - 2b = Connection to motorcycle wiring harness
  - 3 = Timing advance unit
  - 4 = Test wells (for motortester)
  - 5 = Test sockets (for voltage measurement)
  - 6 = Test sockets (for resistance measurement)
  - 7 = Test sockets (for motortester)
  - 8 = Program switch "V"
  - 9 = Program switch " $\Omega$ "
  - 10 = Button panel for simulation of operating conditions
- Button 1 = not occupied
  - Button 2 = not occupied
  - Button 3 = stopping engine
  - Button 4 = not occupied
  - Button 5 = not occupied
  - Button 6 = not occupied

Test step 1		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position:</u> 1	On voltmeter: approx. battery voltage   If reading O.K., con- tinue testing with test step 2.	<u>Component:</u>  Battery Ignition switch Emergency ignition switch
<u>Program switch "Ω"</u> <u>at position:</u> -		
<u>Measuring equipment:</u> Voltmeter		<u>Operation:</u>  Power supply Timing advance unit term.10 and term.1
<u>Measuring range:</u> 0...15 V		
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		<u>Malfunction:</u>  No voltage reading
<u>Operation on motorcycle:</u> (Timing advance unit not con- nected) Switch on ignition switch and emergency ignition switch.		

1 = Timing advance unit plug

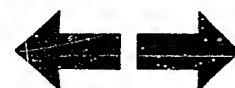


### Trouble-shooting:

If set value of approx. battery voltage was not reached, test for open circuit in cable from positive battery terminal to ignition switch through emergency ignition switch to timing advance unit plug term.10 and in cable from negative battery terminal to timing advance unit plug term.1. Eliminate open circuit.

**C10**

Test chart for universal test adapter  
BMW motorcycle



**C11**

Test chart for universal test adapter  
BMW motorcycle





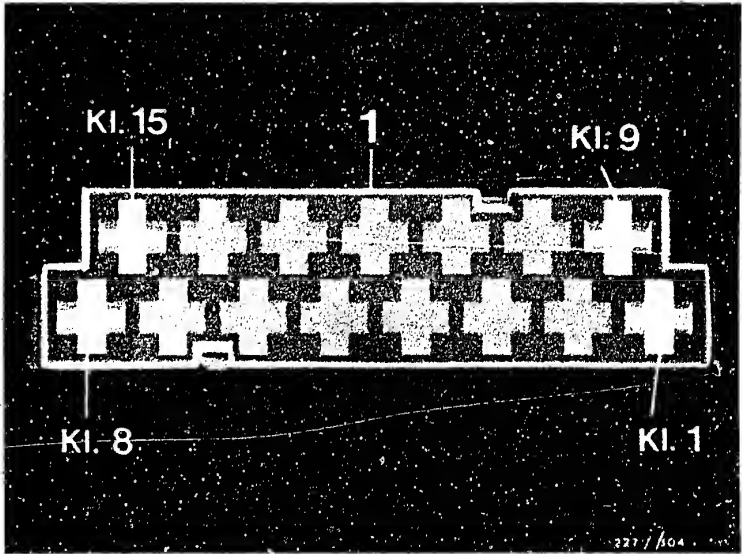
Test step 2		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u>	2	<u>Component:</u>  Electric fuel pump relay (control circuit)
<u>Program switch "Ω"</u> <u>at position:</u>	-	
<u>Measuring equipment:</u> Voltmeter	If reading O.K., con- tinue testing with test step 3.	<u>Operation:</u>  Power supply (+) Electric fuel pump relay term.7
<u>Measuring range:</u> 0...15 V		
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		<u>Malfunction:</u>  No voltage reading
<u>Operation on motorcycle:</u> (Timing advance unit not con- nected) Switch on ignition switch and emergency ignition switch.		

1 = Timing advance unit plug

Trouble-shooting:

If set value of approx. battery voltage was not reached, test for open circuit in cable from ignition switch to emergency ignition switch through electric fuel pump relay term.86, through pull-in winding of electric fuel pump relay to term.85 and to timing advance unit plug term.7.

Eliminate open circuit.

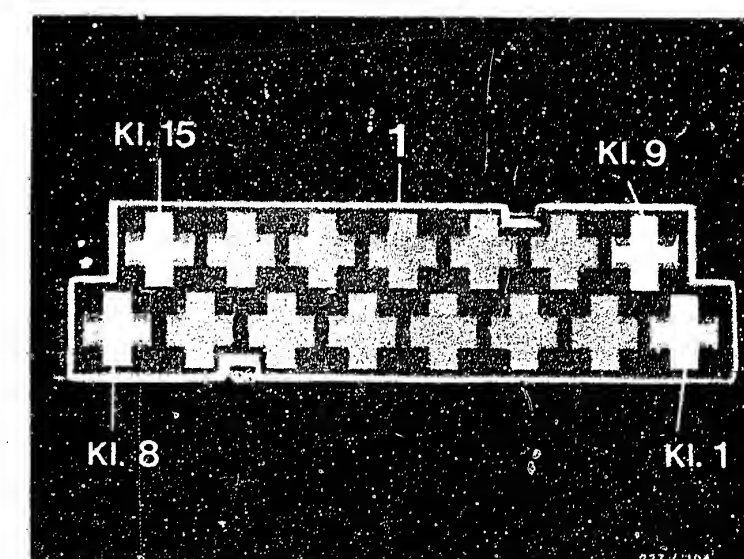


Test step 3		
Operation	Reading	Testing
Program switch "V" at position 3	On voltmeter: approx. half battery voltage.  If reading O.K., continue testing with test step 4.	Component: Ignition coil primary circuit
Program switch "Ω" at position: -		
Measuring equipment: Voltmeter		Operation: Power supply Timing advance unit term.14
Measuring range: 0...15 V		
Connection: Test socket/test well red (+) Test socket/test well black (-)		Malfunction: No voltage reading
Operation on motorcycle: (Timing advance unit not connected) Switch on ignition switch and emergency ignition switch.		

1 = Timing advance unit plug

#### Trouble-shooting:

If set value of approx. half battery voltage was not reached, test for open circuit in cable from ignition switch to emergency ignition switch through ignition coil term.15, primary winding (1.9...3.0 Ω), ignition coil term.1 to timing advance unit plug term.14.  
Eliminate open circuit.



**C14**

Test chart for universal test adapter  
BMW motorcycle



**C15**

Test chart for universal test adapter  
BMW motorcycle

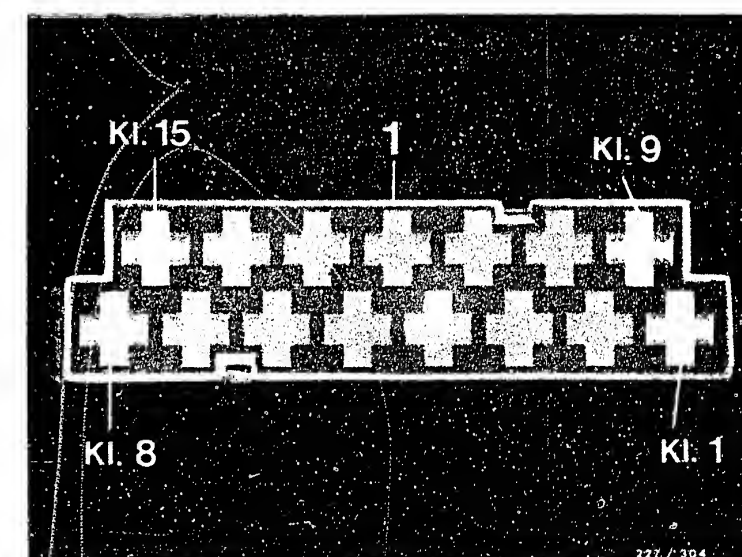


Test step 4		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u>	4	<u>Component:</u> Ignition coil primary circuit
<u>Program switch "Ω"</u> <u>at position:</u>	-	
<u>Measuring equipment:</u> Voltmeter	If reading O.K., continue testing with test step 5.	<u>Operation:</u> Power supply Timing advance unit term.9
<u>Measuring range:</u> 0...15 V		
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		<u>Malfunction:</u> No voltage reading
<u>Operation on motorcycle:</u> (Timing advance unit not connected) Switch on ignition switch and emergency ignition switch.		

1 = Timing advance unit plug

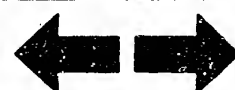
#### Trouble-shooting:

If set value of approx. half battery voltage was not reached, test for open circuit in cable from ignition switch to emergency ignition switch through ignition coil term.15, primary winding (1.9...3.0 Ω), ignition coil term.1 to timing advance unit plug term.9. Eliminate open circuit.



**C16**

Test chart for universal test adapter  
BMW motorcycle



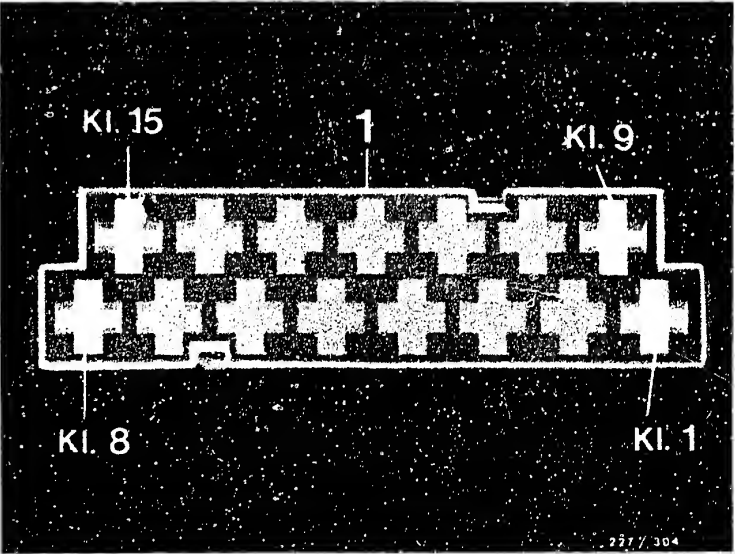
**C17**

Test chart for universal test adapter  
BMW motorcycle



Test step 5		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u>	6	<u>Component:</u>  Starting switch
<u>Program switch "Ω "</u> <u>at position</u>	-	
<u>Measuring equipment:</u> Voltmeter	If reading O.K., con- tinue testing with test step 6.	<u>Operation:</u>  Power supply Timing advance unit term.6
<u>Measuring range:</u> 0...15 V		
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		<u>Malfunction:</u>  No voltage reading
<u>Operation on motorcycle:</u> (Timing advance unit not con- nected). Switch on ignition switch and emergency ignition switch. Pull clutch lever fully. Operate starting switch (starting motor does not operate).		

1 = Timing advance unit plug



Trouble-shooting:

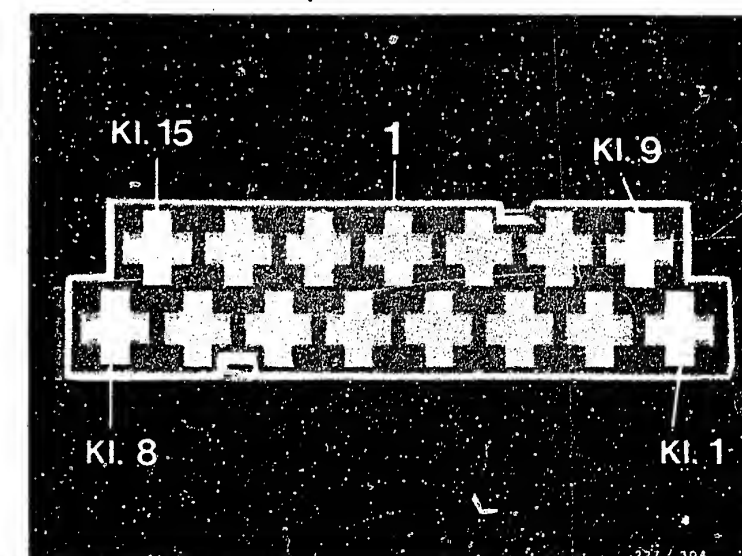
If set value of approx. battery voltage was not reached, test for open circuit in cable from ignition switch to emergency ignition switch, through clutch switch to starting switch. Eliminate open circuit.

Test step 6		
Operation	Reading	Testing
Program switch "V" at position 7	On voltmeter: approx. battery voltage  If reading O.K., con- tinue testing with test step 7.	Component:  Starting interlock relay
Program switch "Ω" at position -		
Measuring equipment: Voltmeter		Operation:  Power supply Timing advance unit term.11
Measuring range: 0...15 V		
Connection: Test socket/test well red (+) Test socket/test well black (-)		Malfunction:  No voltage reading
Operation on motorcycle: (Timing advance unit not con- nected). Switch on ignition switch and emergency ignition switch. Pull clutch lever fully. Operate starting switch (starting motor does not operate).		

#### Trouble-shooting:

If set value of approx. battery voltage was not reached, test for open circuit in cable from ignition switch through emergency ignition switch, through clutch switch, through starting switch, through starting interlock relay (term.86, pull-in winding, term.85) to timing advance unit plug term.11.  
Eliminate open circuit.

1 = Timing advance unit plug



**C20**

Test chart for universal test adapter  
BMW motorcycle



**C21**

Test chart for universal test adapter  
BMW motorcycle



<u>Test step 7</u>		
<u>Operation</u>	<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> <u>at position</u> 8	On voltmeter: 0 V  If reading O.K., continue testing with test step 8.	<u>Component:</u>  Timing advance unit
<u>Program switch "Ω"</u> <u>at position</u> -		
<u>Measuring equipment:</u> Voltmeter		<u>Operation:</u>  Ground connection in trigger box term.4 (ignition trigger unit shielding)
<u>Measuring range:</u> 0...15 V		
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		<u>Malfunction:</u>  Voltage reading approx. battery voltage
<u>Operation on motorcycle:</u> Switch off ignition switch. Connect timing advance unit. Switch on ignition switch and emergency ignition switch.		

### Trouble-shooting:

If set value of 0 V was not reached, replace timing advance unit.



Test step 8		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u> 9	On voltmeter: 0 V  If reading O.K., continue testing with test step 9.	<u>Component:</u>  Timing advance unit
<u>Program switch "Ω"</u> <u>at position</u> -		
<u>Measuring equipment:</u> Voltmeter		<u>Operation:</u>  Ground connection in timing advance unit term.3 (ignition trigger unit)
<u>Measuring range:</u> 0...15 V		<u>Malfunction:</u>  Voltage reading approx. battery voltage
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		
<u>Operation on motorcycle:</u> (Timing advance unit connected) Switch on ignition switch and emergency ignition switch.		

### Trouble-shooting:

If set value of 0 V was not reached, replace timing advance unit.

**D1**

Test chart for universal test adapter  
BMW motorcycle



**D2**

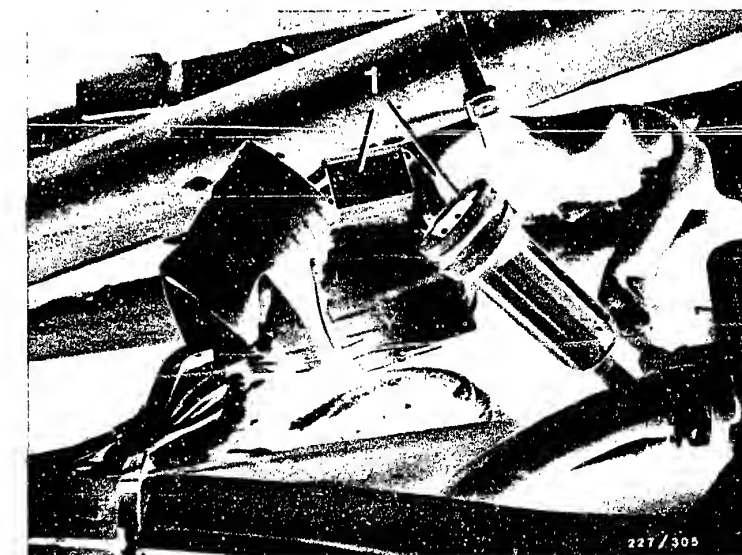
Test chart for universal test adapter  
BMW motorcycle





Test step 9		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u> 10	On voltmeter: approx. 10 V    If reading O.K., con- tinue testing with test step 10.	<u>Component:</u>  Timing advance unit
<u>Program switch "Ω"</u> <u>at position</u> -		
<u>Measuring equipment:</u> Voltmeter		<u>Operation:</u>  Power supply Timing advance unit term.2
<u>Measuring range:</u> 0...15 V		
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		<u>Malfunction:</u>  No voltage reading
<u>Operation on motorcycle:</u> (Timing advance unit connected) Switch on ignition switch and emergency ignition switch.		

1 = Ignition trigger unit plug connector



#### Trouble-shooting:

If set value of approx. 10 V was not reached, disconnect ignition trigger unit plug connector. See picture.  
If set value is now reached, replace ignition trigger unit.  
If set value not yet reached, replace timing advance unit.

**D3**

Test chart for universal test adapter  
BMW motorcycle

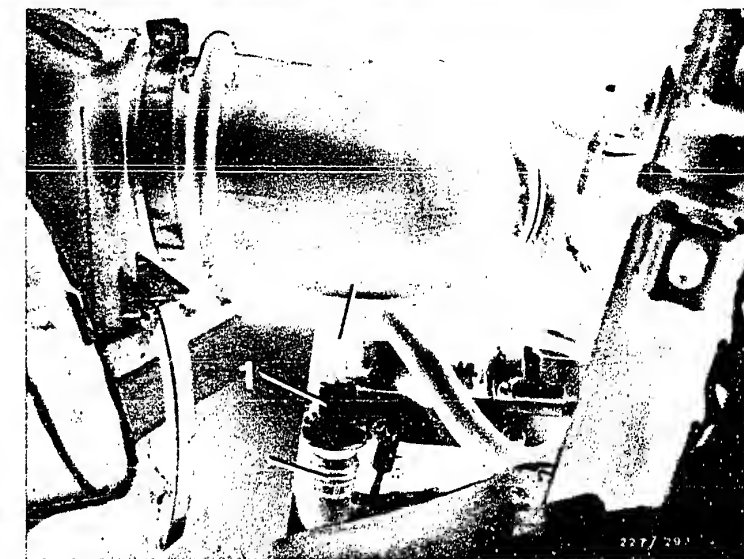


**D4**

Test chart for universal test adapter  
BMW motorcycle

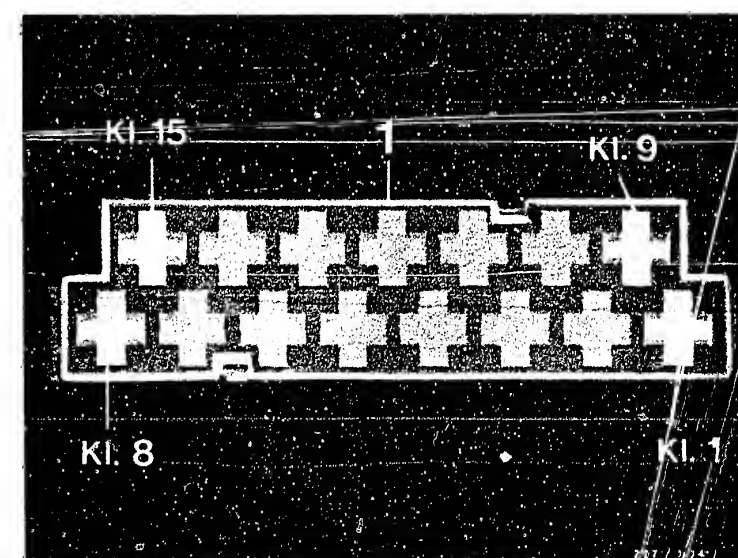


Test step 10		
Operation	Reading	Testing
Program switch "V" at position 11	On voltmeter: approx. 10 V  If reading O.K., con- tinue testing with test step 11.	Component:  Vacuum switch
Program switch "Ω" at position -		
Measuring equipment: Voltmeter		Operation:  Vacuum switch open
Measuring range: 0...15 V		
Connection: Test socket/test well red (+) Test socket/test well black (-)		Malfunction:  Voltage reading approx. 0 V.
Operation on motorcycle: (Timing advance unit connected). Switch on ignition switch and emergency ignition switch.		



- 1 = Vacuum switch
- 2 = Electrical connection
- 3 = Vacuum hose

1 = Timing advance unit plug



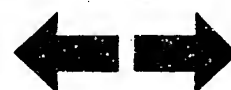
#### Trouble-shooting:

If set value of approx. 10 V was not reached, disconnect electric cable from vacuum switch. If set value of approx. 10 V now reached, replace vacuum switch. If set value not reached, switch off ignition switch and disconnect timing advance unit plug from universal test adapter. Connect ohmmeter to disconnected cable of vacuum switch and to vehicle ground.

If ohmmeter indicates infinity ( $\infty$ ), replace timing advance unit.  
If ohmmeter indicates approx. 0 Ω, eliminate short circuit to ground in electric cable (vacuum switch to timing advance unit plug term. 15).

**D5**

Test chart for universal test adapter  
BMW motorcycle

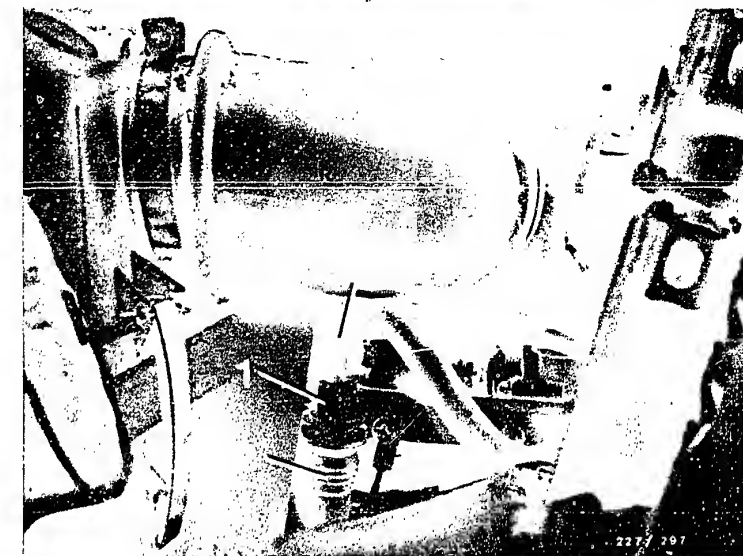


**D6**

Test chart for universal test adapter  
BMW motorcycle

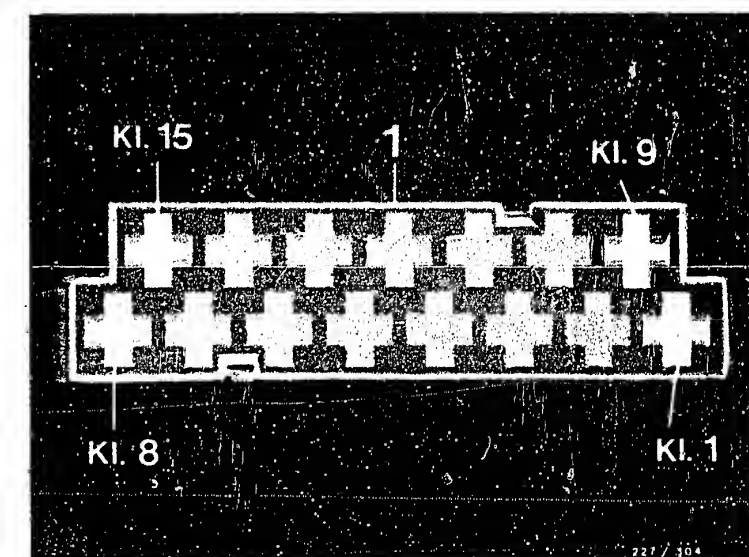


Test step 11		
Operation	Reading	Testing
Program switch "V" at position 11	On voltmeter:  approx. 0 V	Component:  Vacuum switch
Program switch "Ω" at position -		
Measuring equipment: Voltmeter		
Measuring range: 0...15 V	If reading 0.K., con- tinue testing with test step 12.	Operation:  Vacuum switch closed
Connection: Test socket/test well red (+) Test socket/test well black (-)		
Operation on motorcycle: (Timing advance unit connected). Switch on ignition switch and emergency ignition switch. Remove hose from vacuum switch and connect vacuum pump to vacuum switch. Build up vacuum of approx. 400 mbar. Later re- connect vacuum hose.		
		Malfunction:  Voltage reading approx. 10 V



- 1 = Vacuum switch
- 2 = Electrical connection
- 3 = Vacuum hose

- 1 = Timing advance unit plug



#### Trouble-shooting:

If set value of approx. 0 V is not reached, disconnect electric cable from vacuum switch and connect to vehicle ground using auxiliary cable.

If set value of approx. 0 V is now reached, replace vacuum switch.

If set value still not reached, eliminate open circuit between timing advance unit plug term.15 and vacuum switch.

**D7**

Test chart for universal test adapter  
BMW motorcycle



**D8**

Test chart for universal test adapter  
BMW motorcycle

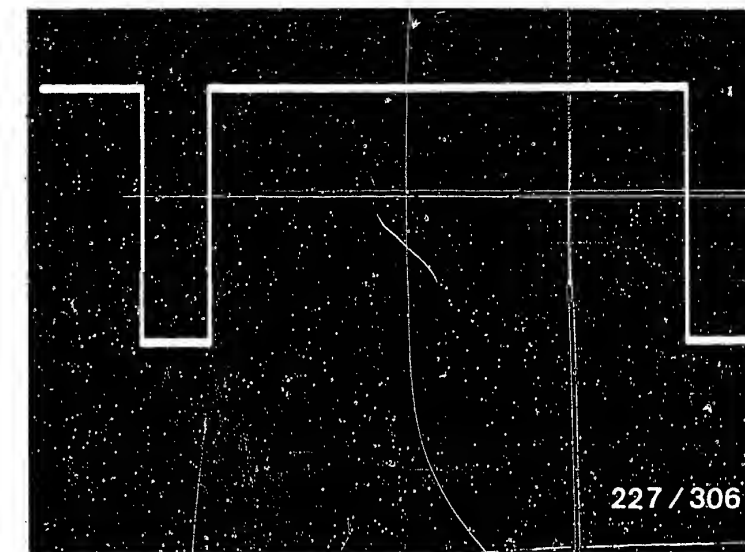


Test step 12		
Operation	Reading	Testing
Program switch "V" at position 12	On oscilloscope: rectangular pulse	Component:
Program switch "Ω" at position -		Ignition trigger unit including connecting cable
Measuring equipment: Oscilloscope "special input"		Operation:  Igniton trigger unit delivers rectangular pulse (on/off ratio) to timing advance unit term.5
Measuring range: 0...100 %		
Connection: Red clip to red test well (+), black clip to black test well (-)		
Operation on motorcycle: (Timing advance unit con- nected). Switch on ignition switch and emergency ignition switch. Start engine and operate at idle.	If reading O.K., con- tinue testing with test step 13.	Malfunction:  No rectangular pulse

#### Trouble-shooting:

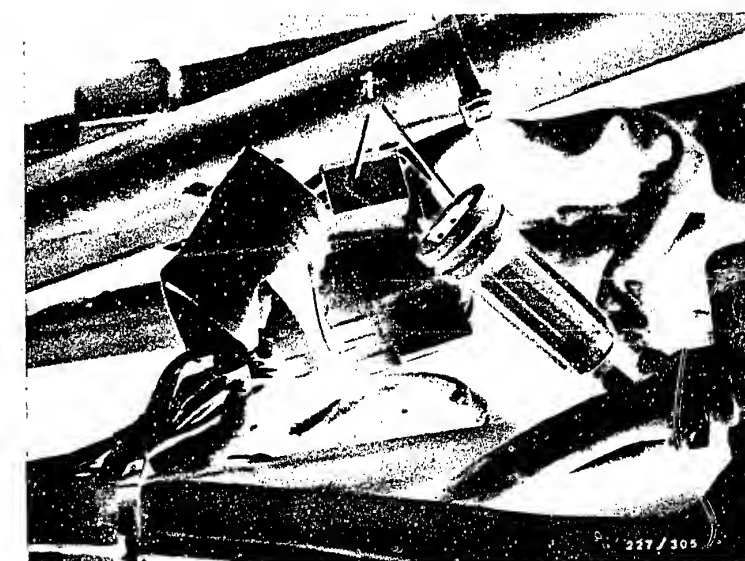
If no rectangular pulse, switch off ignition switch.  
Disconnect timing advance unit plug from universal test adapter.  
Disconnect ignition trigger unit plug connector. See bottom picture.

For trouble-shooting see D11/D12



Rectangular pulse

1 = Ignition trigger unit plug  
connector



**D9**

Test chart for universal test adapter  
BMW motorcycle

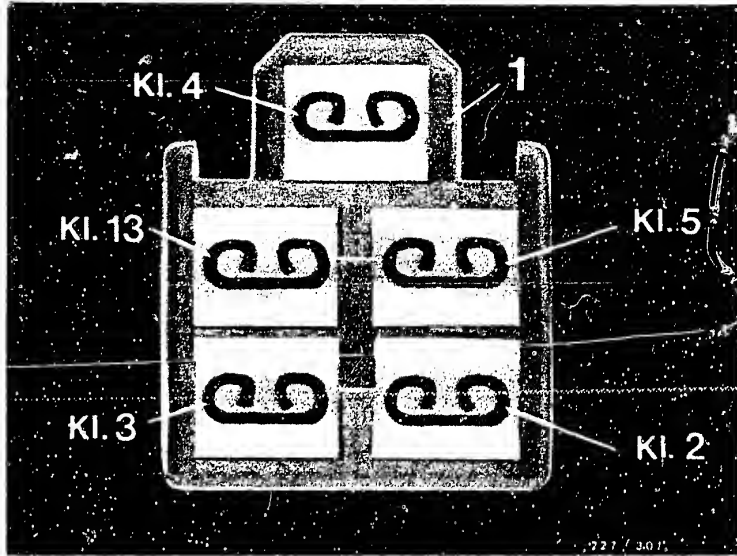


**D10**

Test chart for universal test adapter  
BMW motorcycle

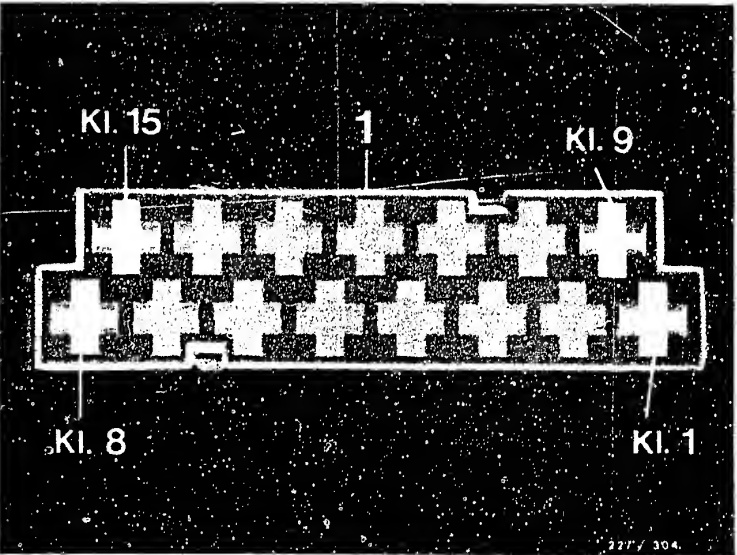


Test step 12 (continued)		
Operation	Reading	Testing
Program switch "V" at position	12	Component:
Program switch "Ω" at position	-	
Measuring equipment:		
Measuring range:		Operation:
Connection:		Malfunction:
Operation on motorcycle:		



1 = Ignition trigger unit socket  
(top view from front)

1 = Timing advance unit plug



Trouble-shooting: (continued from D9/10)

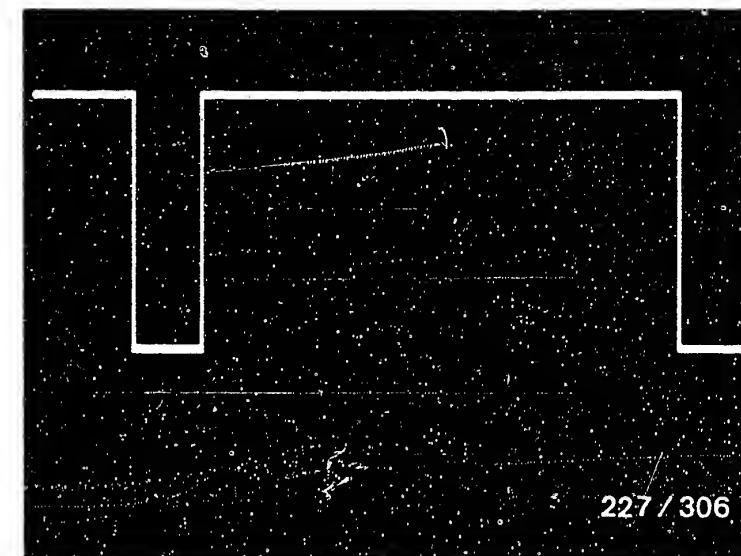
Connect ohmmeter with test prods one after the other to:

Timing advance unit plug		Ignition trigger unit socket
term. 5	and	term. 5
term. 2	and	term. 2
term. 3	and	term. 3

Ohmmeter must indicate approx. 0 Ω in each case.  
 If approx. 0 Ω indicated, replace ignition trigger unit.  
 If infinity (∞) indicated, eliminate open circuit between  
 timing advance unit plug and ignition trigger unit socket.

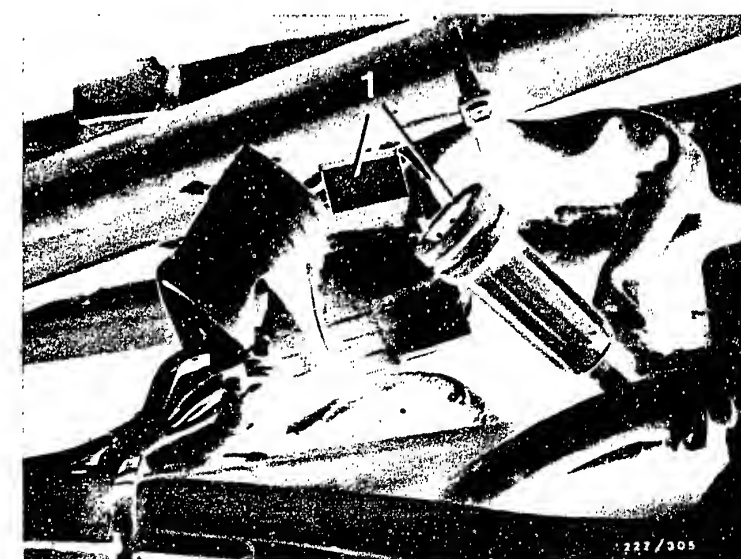


Test step 13		
Operation	Reading	Testing
<u>Program switch "V" at position</u> 13	On oscilloscope rectangular pulse           If reading O.K., continue testing with test step 14.	<u>Component:</u>  Ignition trigger unit including connecting cable
<u>Program switch "Ω" at position</u> -		
<u>Measuring equipment:</u> Oscilloscope "special input"		<u>Operation:</u>  Ignition trigger unit delivers rectangular pulse (on/off ratio) to timing advance unit term.13
<u>Measuring range:</u> 0...100 %		
<u>Connection:</u> Red clip to red test well (+) black clip to black test well (-)		
<u>Operation on motorcycle:</u> (Timing advance unit connected). Switch on ignition switch and emergency ignition switch. Start engine and operate at idle.		<u>Malfunction:</u>  No rectangular pulse



Rectangular pulse

1 = Ignition trigger unit plug connector



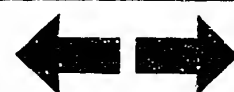
#### Trouble-shooting:

If no rectangular pulse, switch off ignition switch.  
 Disconnect timing advance unit plug from universal test adapter.  
 Disconnect ignition trigger unit plug connector. See bottom picture.

For trouble-shooting see D15/D16

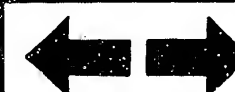
**D 13**

Test chart for universal test adapter  
 BMW motorcycle

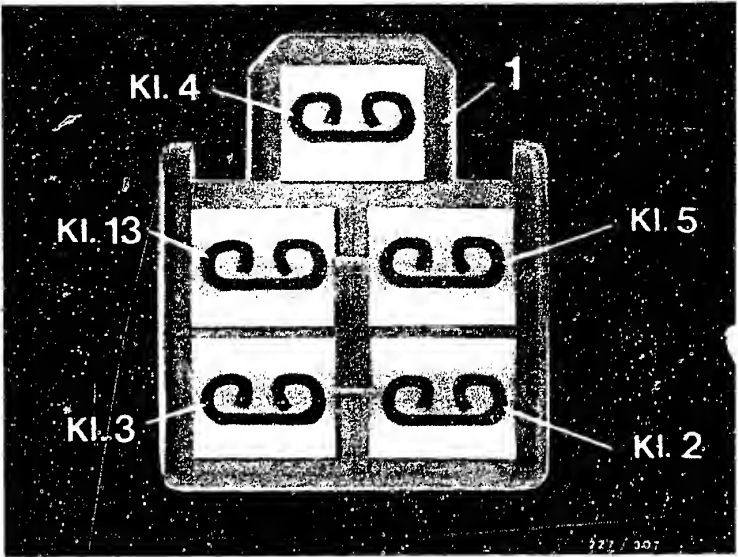


**D 14**

Test chart for universal test adapter  
 BMW motorcycle

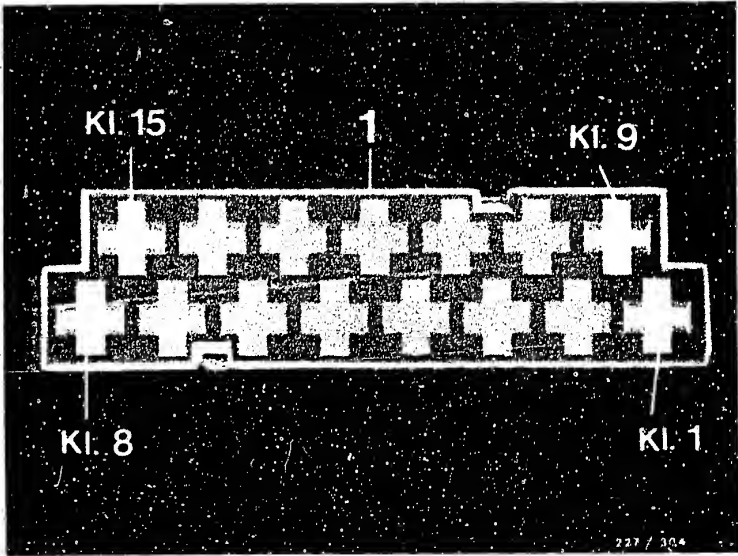


Test step 13 (continued)		
Operation	Reading	Testing
Program switch "V" at position 13		Component:
Program switch "Ω" at position -		
Measuring equipment:		Operation:
Measuring range:		
Connection:		
Operation on motorcycle:		Malfunction:



1 = Ignition trigger unit socket  
(top view from front)

1 = Timing advance unit plug

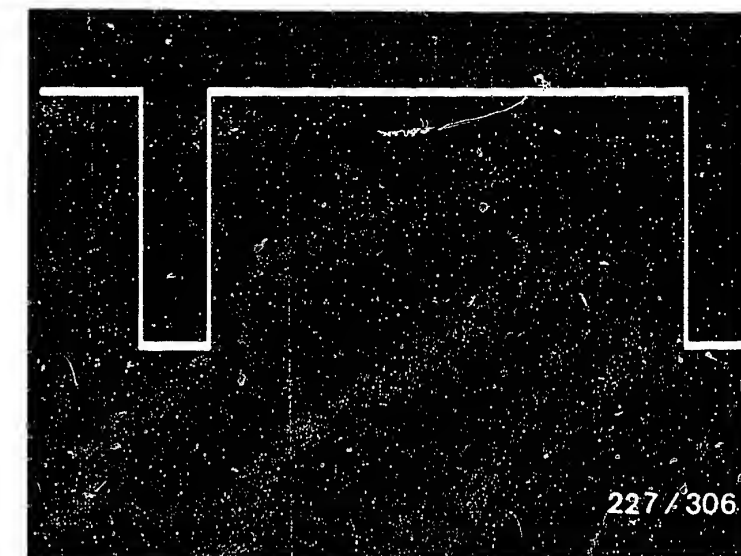


### Trouble-shooting (continued from D13/D14)

Connect ohmmeter with test prods to timing advance unit plug term.13 and ignition trigger unit socket term.13.  
Ohmmeter must indicate approx. 0Ω . If approx. 0 Ω indicated, replace ignition trigger unit.  
If infinity (∞ ) indicated, eliminate open circuit between timing advance unit plug and ignition trigger unit socket.



Test step 14		
Operation	Reading	Testing
Program switch "V" at position 14	On oscilloscope rectangular pulse	Component: Timing advance unit
Program switch "Ω" at position -		
Measuring equipment: Oscilloscope "special input"		Operation: Timing advance unit term.8 delivers rectangular pulse (on/off ratio) to LE-Jetronic term.1
Measuring range: 0...100 %		
Connection: Red clip to red test well (+) black clip to black test well (-)		Malfunction: No rectangular pulse
Operation on motorcycle: (Timing advance unit con- nected). Switch on ignition switch and emergency ignition switch. Start engine and operate at idle.		



Rectangular pulse

#### Trouble-shooting:

If no rectangular pulse, replace timing advance unit.

**D 17**

Test chart for universal test adapter  
BMW motorcycle

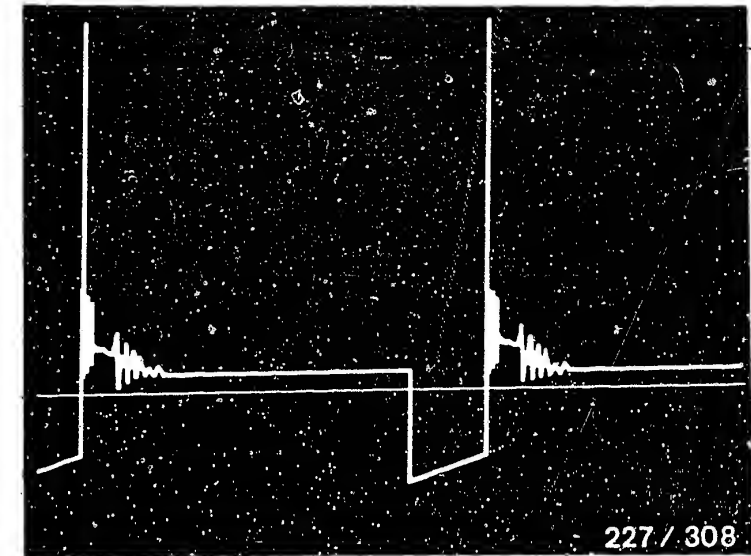


**D 18**

Test chart for universal test adapter  
BMW motorcycle



Test step 15		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u> 15	On oscilloscope: primary signal           If reading O.K., con- tinue testing with test step 16.	<u>Component:</u>  Timing advance unit
<u>Program switch "Ω "</u> <u>at position</u> -		
<u>Measuring equipment:</u> Oscilloscope "special input"		<u>Operation:</u>  Primary signal, output stage "on and off"
<u>Measuring range:</u> ---		<u>Malfunction:</u>  No primary signal
<u>Connection:</u> Red clip to red test well (+), black clip to black test well (-)		
<u>Operation on motorcycle:</u> (Timing advance unit connected). Switch on ignition switch and emergency ignition switch. Start engine and operate at idle.		



Primary signal

Trouble-shooting:

If no primary signal, replace timing advance unit.

Test step 16		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position:</u> 15	On voltmeter: after max. 5 sec. voltage reading must change to approx. half battery voltage.    If reading O.K., con- tinue testing with test step 17.	<u>Component:</u>  Timing advance unit
<u>Program switch "Ω"</u> <u>at position:</u> -		
<u>Measuring equipment:</u> Voltmeter		
<u>Measuring range:</u> 0...15 V		<u>Operation:</u>  Peak-coil-current cut-off
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		
<u>Operation on motorcycle:</u> (Timing advance unit connected). Switch on ignition switch and emergency ignition switch. Start engine and operate at idle. Press button 3 on universal test adapter (only if engine running).		<u>Malfunction:</u>  Voltage reading < 2 V

#### Trouble-shooting:

If after 5 sec. a voltage < 2 V was indicated, replace timing advance unit.

**D21**

Test chart for universal test adapter  
BMW motorcycle

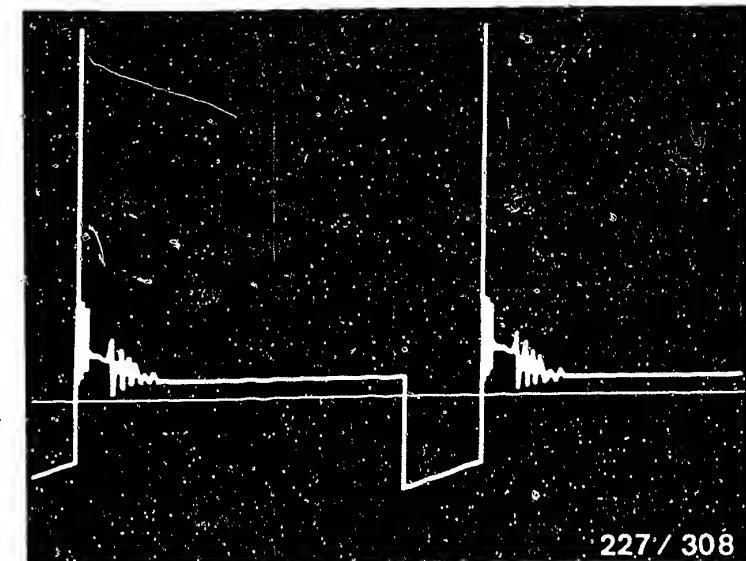


**D22**

Test chart for universal test adapter  
BMW motorcycle



Test step 17		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u> 16	On oscilloscope: primary signal          If reading O.K., con- tinue testing with test step 18.	<u>Component:</u>  Timing advance unit
<u>Program switch "Ω"</u> <u>at position</u> -		
<u>Measuring equipment:</u> Oscilloscope "special input"		<u>Operation:</u>  Primary signal, output stage "on and off"
<u>Measuring range:</u> ---		
<u>Connection:</u> Red clip to red test well (+) black clip to black test well (-)		
<u>Operation on motorcycle:</u> (Timing advance unit connected). Switch on ignition switch and emergency ignition switch. Start engine and operate at idle.		<u>Malfunction:</u>  No primary signal



Primary signal

#### Trouble-shooting:

If no primary signal, replace timing advance unit.

**D23**

Test chart for universal test adapter  
BMW motorcycle



**D24**

Test chart for universal test adapter  
BMW motorcycle



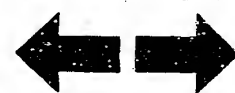
Test step 18		
Operation	Reading	Testing
Program switch "V" at position 16	On voltmeter: after max. 5 sec. voltage reading must change to approx. half battery voltage.  If reading O.K., con- tinue testing with test step 19.	<u>Component:</u>  Timing advance unit
Program switch "Ω" at position -		
Measuring equipment: Voltmeter		<u>Operation:</u>  Peak-coil-current cut-off
Measuring range: 0...15 V		
Connection: Test socket/test well red (+) Test socket/test well black (-)		<u>Malfunction:</u>  Voltage reading < 2 V
Operation on motorcycle: (Timing advance unit connected). Switch on ignition switch and emergency ignition switch. Start engine and operate at idle. Press button 3 on universal test adapter (only if engine running).		

### Trouble-shooting:

If after 5 sec a voltage < 2 V was indicated, replace timing advance unit.

**E1**

Test chart for universal test adapter  
BMW motorcycle

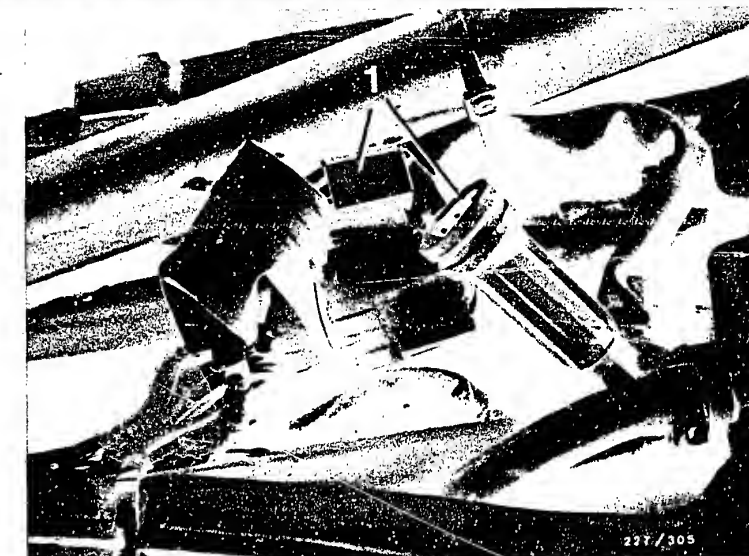


**E2**

Test chart for universal test adapter  
BMW motorcycle



Test step 19		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u> 7	On voltmeter: < 2 V  If reading O.K., con- tinue testing with test step 20.	<u>Component:</u>  Timing advance unit
<u>Program switch "Ω"</u> <u>at position</u> -		
<u>Measuring equipment:</u> Voltmeter		<u>Operation:</u>  Power supply Timing advance unit term.11 (negative) for starting interlock relay
<u>Measuring range:</u> 0...15 V		
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black 		



1 = Ignition trigger unit plug  
connector

### Trouble-shooting:

If set value of < 2 V was not reached, replace timing advance unit.  
If set value of < 2 V reached, but starting motor not operating, test  
starting interlock relay and starting motor for proper operation, and  
test connecting cables for open circuit.  
Eliminate open circuit. Replace defective parts.

**E3**

Test chart for universal test adapter  
BMW motorcycle



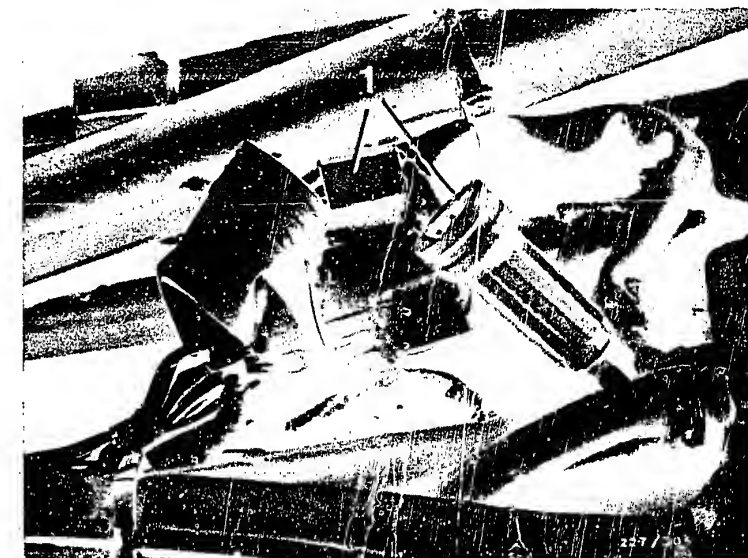
**E4**

Test chart for universal test adapter  
BMW motorcycle





Test step 20		
Operation	Reading	Testing
<u>Program switch "V" at position</u> 2	On voltmeter: $< 2 \text{ V}$	<u>Component:</u>  Timing advance unit
<u>Program switch "Ω" at position</u> -		
<u>Measuring equipment:</u> Voltmeter		<u>Operation:</u>  Power supply Timing advance unit term.7 (negative) for electric fuel pump relay
<u>Measuring range:</u> 0...15 V		
<u>Connection:</u> Test socket/test well red (+) Test socket/test well black (-)		<u>Malfunction:</u>  approx. battery voltage
<u>Operation on motorcycle:</u> (Timing advance unit connected). Disconnect ignition trigger unit plug connector. Switch on ignition switch and emergency ignition switch. Switch on starting switch (starting motor operates).		



1 = Ignition trigger unit plug connector

#### Trouble-shooting:

If set value of  $< 2 \text{ V}$  was not reached, replace timing advance unit.  
 If set value of  $< 2 \text{ V}$  reached, but electric fuel pump not operating,  
 test electric fuel pump relay and electric fuel pump for proper operation,  
 and test connecting cables for open circuit.  
 Eliminate open circuit, or replace defective parts.

**E5**

Test chart for universal test adapter  
 BMW motorcycle



**E6**

Test chart for universal test adapter  
 BMW motorcycle



Testing with the universal test adapter is now completed.

Note:

If customer complaint still not remedied, then trouble may lie with fuel system, or engine not mechanically O.K.

**E7**

Test chart for universal test adapter

BMW motorcycle



# After-sales Service

## Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

22

### Danger of Accident on Semi-conductor Ignition Systems

VDT-I-227/102 B

11.1976

Please be sure to pass this bulletin on to your employees for their attention.

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to manufactures starting to equip their vehicles with semi-conductor ignition systems as original equipment. In most cases the performance of nearly all makes of such systems is higher than that of conventional systems, and further improvements are to be expected. This means that semi-conductor ignition systems have reached the point where contact with "live" parts or contacts (whether on the primary side or the secondary side) can prove fatal.

In this connection we should like to point out to you that the laws valid in your country regarding work on high-voltage systems must be adhered to when working on, or testing, semi-conductor ignition systems.

As a matter of principle, when working on such ignition systems the ignition is to be switched off. Included in such work are the following operations:

- Connection of engine testing equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacement of ignition system parts (spark plugs, ignition coil, ignition distributor, H.T. ignition cables etc.).

If it is necessary to switch on the ignition in order to test the system or make adjustments on the engine (to the carburetor for instance), then lethal voltages are present throughout the entire system.

This means that the danger of accident exists not only at individual components in the system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also at the wiring harness (e.g. connection for the tachometer, diagnostic connector), on terminals, and on test equipment.

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**L1**

Technical Bulletin

BMW motorcycle

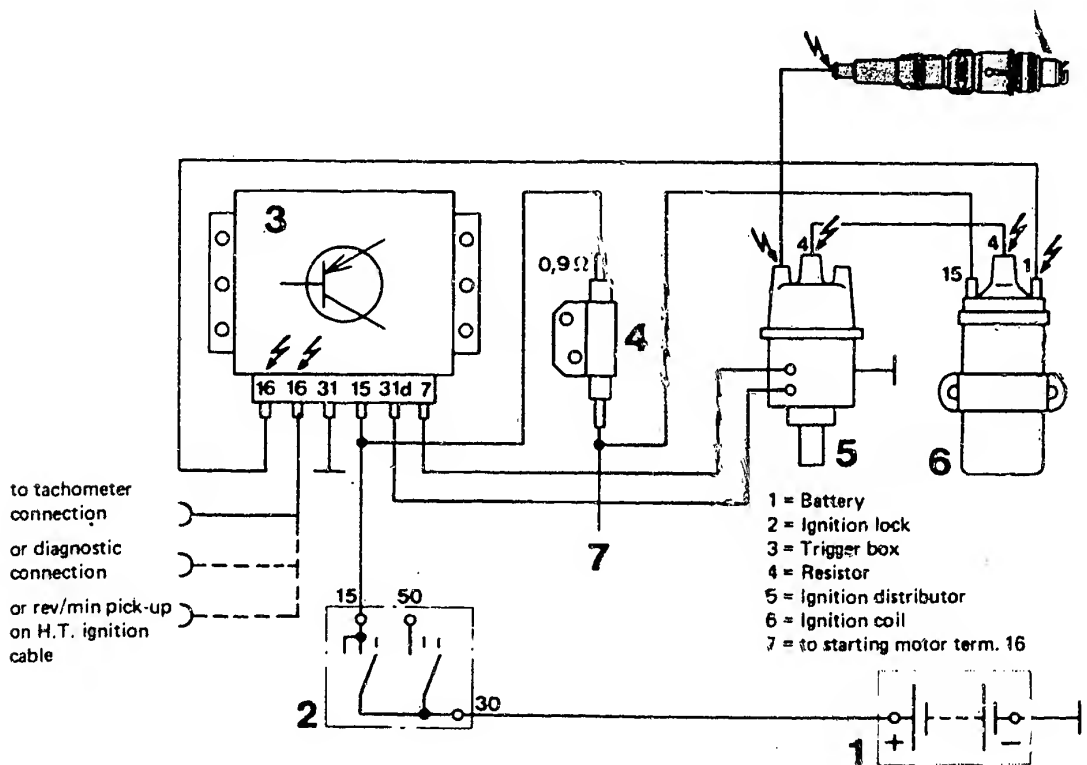


In addition, in the case of the capacitor-discharge ignition system (CDi), danger of accident is also present under the following circumstances:

- Operation of the trigger box without the ignition transformer.
- At the trigger box, (removed), relatively soon after it has been switched off (capacitor discharge).

Below is a typical terminal diagram of a semi-conductor ignition system, the danger points are marked with red high-voltage arrows. We would point out that all semi-conductor ignition systems, even the older ones, are to be regarded as dangerous in the sense as defined by this bulletin.

Please address any queries or comments concerning the contents of this publication to our representative in your country.



Terminal diagram

# After-sales Service

## Technical Bulletin

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EFFECTS OF ELECTRICAL AND ELECTRONIC  
SYSTEMS ON HEART PACEMAKERS

VDT-I-227/107 En  
1.1981

e.g. ignition systems, Jetronic, Motronic, ABS

Please ensure without fail that this Bulletin is passed on to your employees for their attention!

We have often been asked by some of our customers whether or not patients with heart pacemakers are endangered in any way by ignition systems. This theme was recently the subject of an examination carried out by the Ignition System Development Department of Robert Bosch GmbH in conjunction with Dr. Thull, lecturer at the Central Institute for Biomedical Technology at the University of Erlangen-Nürnberg and Biotronic GmbH & Co. of Berlin, a manufacturer of heart pacemakers. The magazine "Biomedizinischen Technik" (5/80) listed the results.

The most important discoveries in this practice can be summarized from the examination report as follows:-

1. Heart pacemakers corresponding to the latest state of the art are not affected by radiation (electromagnetic fields) from ignition systems.
2. With a stationary engine and the ignition switched off the heart pacemaker is not affected by any part of the ignition system, even when unintentionally touched. Maintenance work in the engine compartment, for example, can then be carried out without any danger.
3. With the engine running or stationary with the ignition switched on, touching current-carrying parts of the ignition system, as well as parts of any other electrical system, presents a certain danger for everybody. The heart pacemaker can here be affected under certain conditions (voltage, current and frequency).  
Patients with heart pacemakers should therefore at all costs avoid touching current-carrying parts of electrical systems.
4. Furthermore, patients with heart pacemakers are more inclined to psychic shock effects than other people, even when they receive just a harmless electric shock, because many such patients are conscious of the increased danger to the cardiac activity.

We therefore consider it inadvisable for patients with heart pacemakers to be employed in workshops or on vehicles where ignition systems are being tested or repaired. If any members of your staff have heart pacemakers please carry out the necessary measures.

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**L3**

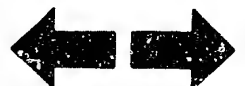
Technical Bulletin

BMW motorcycle



We would like to add that heart pacemakers are not expected to be affected in any way by interference from other electronic products and systems which we manufacture, such as the Antiskid System (ABS), Jetronic, Motronic, because the much greater radiation intensity of the ignition systems examined in normal use has not caused any interference to heart pacemakers corresponding to the latest state of the art.

If you should receive questions on this matter from customers, please inform them accordingly.





# After-sales Service

## Technical Bulletin

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NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-1-227/108 En

1. 1983

The introduction of new ignition systems has made it necessary to reclassify all designations.

The designations listed below will be used immediately in KH workshop and sales literature.

Designation	Abbrev'd code	Meaning	Switching	Ignition control and spark advance	High-voltage distribution
Coil ignition	SZ (CI)	-----	Mechanical (breaker points)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized coil ignition	TSZ-K (TCI-c)	K=breaker-triggered	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Trigger box with conventional circuit techniques	TSZ-I* (TCI-i)	I=Induction-type pulse generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
	TSZ-H	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized ignition	TZ-I* (TI-i)	I=Induction-type pulse generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
(Trigger box in Hybrid technique)	TZ-H* (TI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)

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**L5**

Technical Bulletin

BMW motorcycle



Designation	Abbrev'd code	Meaning	Switching	Ignition control and spark advance	High-voltage distribution
Breakerless semiconductor ignition with or without knock control	EZ EZ-K	- K=Knock control	Electronic (trigger box or control unit)	Electronic (control unit)	Mechanical (ignition distributor or high-voltage distributor)
Distributorless ignition with or without knock control	VZ VZ-K	- K=Knock control	Electronic (control unit)	Electronic (control unit)	Electronic (dual-spark ignition coil, or 1 ignition coil for each spark plug)

\*Note: The ignition system can also be equipped with a DLS unit (digital idle stabilization) or with an ELS unit (electronic idle stabilization) or with an ESV unit (electronic ignition retardation).



# After-sales Service

## Motor Vehicle Service Information

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TESTS ON ELECTRONIC IGNITION SYSTEMS  
(TCI, TZ)  
TESTER INSTRUCTIONS

VDT-I-Gen. 035 En  
3.1981

The following tests are listed in older and current Tester operating instructions or in Trouble-shooting with the oscillograph:

- "Separate ignition coil test" (concerns EFAW 213, 214, 268, AE 2000).
- "Calculating the "ignition voltage reserve"" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).
- "Intensified insulation test" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).

Nowadays transistorized ignition systems deliver more than 30,000 V secondary voltage.

To avoid damage to ignition coil, ignition cable and ignition distributor by voltage flashovers, the tests listed above should not be carried out on transistorized ignition systems.

The contents of this Service Information has already been published in the K7-Information K7-VJF 17/8012.

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**L7**

Motor Vehicle Service Information

BMW motorcycle



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